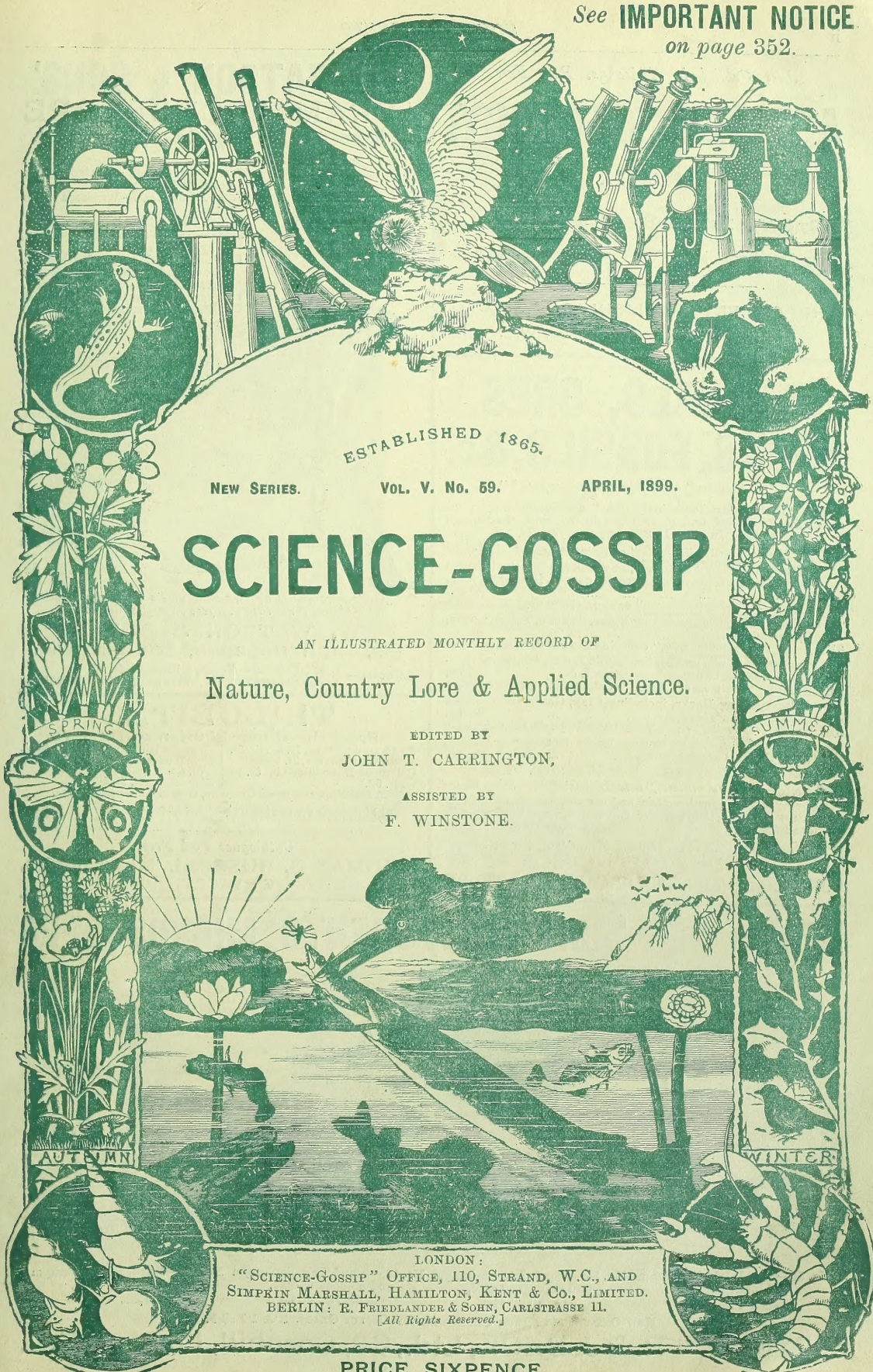
See **IMPORTANT NOTICE** *on page* 352.



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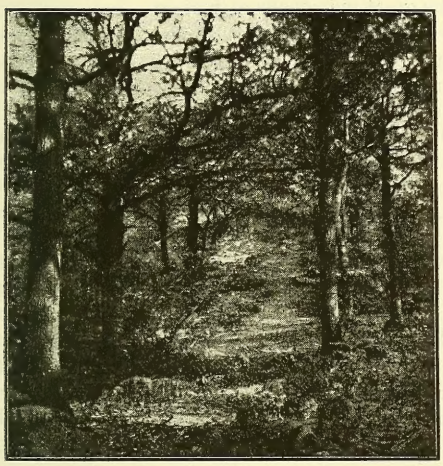
PRESERVATION OF CROHAM HURST.

By Edward A. Martin, F.G.S.

TEN miles from the Royal Exchange, and contiguous to the county borough of Croydon, is the well-known hill of Croham Hurst, bearing on its summit some of the loveliest bits of wood-



Jeffery, Photo. *Croydon.*
View in Croham Hurst.

land scenery to be seen within reasonable distance of London. It is a favourite resort in the summer for botanical and geological rambling clubs, and has great attractions for the fungus hunter in the autumn on account of the rarities to be found there. The whortleberry (*Vaccinium myrtillus*) flourishes, and the lily-of-the-valley (*Convallaria majalis*) finds a soil suited to its needs. The common ling (*Calluna vulgaris*), covers the southern declivities in profusion, and in other parts the bracken spreads its feathery forest sometimes as much as six feet in height.

It is of special interest geologically. At its base, forming the subsoil of the fields around, is the chalk formation. It is, therefore, an instance of a Tertiary outlier, and as such is regularly visited by parties of student geologists who, without going far afield, desire to make acquaintance with this form of geological phenomena. According to the maps, it is surrounded at its immediate base by a ring of Thanet beds, this being succeeded by another of Woolwich beds. These two are evidently very thin. The mass of the Hurst is made up of Oldhaven pebble beds, and on the summit these are strongly in evidence. In some places the pebbles are very small, but are of average size on the slopes. On the south side we have the steep place known as "Break-neck Hill," and here the pebbles are loose through the constant fretting of ages of weathering, and, it must be confessed, by the fretting of the number of pairs of feet of frequent visitors.

It is not in regard to the scientific aspect of Croham Hurst that I wish now to write. This lovely hill, with its woody glades, its magnificent views, its specially interesting geological character, and its health-giving breezes, is threatened by the omnivorous builder. Croydon has been creeping nearer and nearer to the base of the hill, and at last the Hurst itself is threatened. It has been an open space for many years, and Croydon's hundred thousand of inhabitants have ever enjoyed the privilege of roaming over and around it. Certainly there were warning boards, calling attention to the fact that the Hurst was owned by the Governors of the Whitgift Foundation, an institution founded three hundred years ago for the good of the poor in the borough. People in Croydon had come to believe that the Governors in their generosity had determined that the public should exercise the privilege of rambling undisturbed for ever; and it came as a shock to them to know that its sale for building purposes was contemplated.

By the activity of a former mayor of Croydon, Sir Frederick Edridge, negotiations were recently completed for the purchase by the Corporation for £1,000 of thirty-five acres out of a total

Jeffery, Photo. *Croydon.*
View in Croham Hurst.

of about eighty-five acres. The expenses in connection with the matter will be, it is estimated, about £4,000 more. As eligible building sites, the Governors calculate that the remainder will

bring them a revenue of £1,000 per annum, so that if they insist on asking that the remaining land shall be valued at building prices in the event of the Corporation desiring to purchase the rest, there is a possible expenditure of £20,000 to £30,000, and it is improbable the people of Croydon will consent to place this amount on the rates. It is to be hoped that the Governors will remember they are themselves the guardians of public money in this respect. When Archbishop Whitgift endowed his hospital with the various lands of which Croham Hurst is but a portion, of course he little thought that the "betterment" accruing to the endowments would amount to such value as now attaches to it three hundred years after his gift. He would have been one of the first to acknowledge the indebtedness of his hospital to the people of the borough for the increased value which had accrued. Had Croydon been so carelessly served by her Councillors that she now enjoyed any other position in the Registrar-General's list of healthy towns than that of head, thousands would never have been attracted to her boundaries, and the town would have ceased to grow. The people of Croydon have, by sending to represent them in the Council Chamber leading men of honesty and probity, actually placed in the hands of the Whitgift Trust the unearned increment which is now theirs. Is it too much to expect that this will be acknowledged when the matter of naming a price is being considered by the Governors?

In the meantime, all interested in the Open Space Movement in general, and in the preservation of Croham Hurst in particular, can assist by letting their wishes be known to those who now threaten the Hurst, and, personally, I shall be glad to have all the support possible, in striving to procure the dedication of Croham Hurst for ever to the people, not only of Croydon, but of the great metropolis of Britain.

On the 10th of March, an enthusiastic public meeting was held in Croydon, at which the following resolutions were unanimously adopted and forwarded to the Whitgift Trustees. (1) "That this meeting is strongly in favour of the acquisition of the whole of Croham Hurst for the people for ever, and pledges itself to use every endeavour to attain that object." (2.) "That this meeting hopes, that, if it is not within the power of the Whitgift Governors to present the Hurst as a free gift to the town, they will name such a moderate price for it as will enable the Croydon County Council to acquire it."

After such an expression of public opinion, it is to be hoped the Trustees will see their way to presenting the Hurst to the Borough of Croydon.

69, *Bensham Manor Road,*
Thornton Heath.

MOLLUSCS IN ASIA MINOR.

By J. Bliss.

EARLY one January morning, a friend and I set off from our resting place at the foot of Mycale, for a day's wandering about the ruins of Magnesia ad Maeandrum, recently excavated by Dr. Humann on behalf of the Imperial Museum at Berlin. Our small but hardy Turkish horses carried us briskly along the level swampy plain of the Maeandre, the road following the foot of a southern branch of the Messogis mountains, over the steep cliffs of which we noticed flocks of two kinds of vultures, the one a large, the other a small species, and numerous wild pigeons. Traces of wild boar were plentiful, and close to the village of Kemmer we saw the body of a large hyaena (*Hyaena striata*), shot by some shepherds during the night whilst prowling round their sheepfold. Many years previously I shot a wolf near the same spot, but with the extension of roads and railways making the country easier of access to western sportsmen these carnivorae have at the present time generally to be sought deeper in the mountain ranges.

Tekke, the village now occupying part of the site of the ancient town of Magnesia, is a collection of hovels, most of the walls being composed of wickerwork plastered inside with mud, the roofs thatched with reeds and the liquorice plant (*Glycyrrhiza glabra*), which grows abundantly in the neighbourhood. The inhabitants are Turks, Negroes (the descendants of slaves brought in years gone by from the Soudan), and Circassians who emigrated from Roumelia after the Russo-Turkish war in 1878. They settled there after being driven from their original homes in the Kuban valley a quarter of a century earlier.

Arriving there we wandered over the remains of the once beautiful temple of Artemis Leucophryene, round the Agora, now some feet below the level of the surrounding ground, thence to the Stadium, and on to the Theatre. An extensive view is there obtained of the valley of the Lethaeus, bounded by Thorax and the main range of the Messogis mountains. At their foot, and only some two miles away, may be noticed the entrance to the large cave designated by M. Texier the cave of Apollo, and near are some hot springs. Over a low range of hills to the east, we can see the lovely plateau of Tralles; beyond is the site

of Nyssa; and further still, the hills sheltering Mastavron, some fifty miles distant.

The object of our visit, however, was neither to study the ancient remains nor to admire the scenery, and whilst appreciating both, we were too eager to learn what molluscs dwelt there to devote much time to either. Stones were therefore turned over industriously, bushes searched, moss carefully picked, and walls scanned, until the declining sun, with the rising miasma, and the knowledge that a band of brigands were in the neighbourhood, warned us that we must not linger longer. Mounting our horses, we quickly traversed the twelve miles separating us from home.

The following is the list of our takings: *Helix lens* Ferrusae; *H. virgata* Da Costa, with several varieties; *H. variabilis* Drp.; *H. aspersa*; *H. lucorum*; *Buliminus pupa*; *B. quadridens* Mull; *Pupa doliolum* Brug; *Vitrea spratti* Westerland; *V. koutaisiana* Mousson; *Zonite smyrnensis*; *Melanopsis proerona*; *Limnea peregra*; *Valvata aegyptiaca*; *Bythinia ventricosa* Grey.

I am indebted for the identification of some of these shells to the kindness of my friend, the Rev. Prof. H. M. Gwatkin, M.A., of Cambridge, and Mr. E. A. Smith, of the British Museum.

In addition, we found in the crevices of the stone seats of the Theatre a number of specimens of a brown *Clausilia*, regarding which Dr. Boettger, of Frankfort, writes: "I believe I recognise in it the lost *Clausilia (Pseudalinda) semidenticulata* Pfr."

The following morning we started for the ruins of Priene and Miletus, though circumstances prevented our carrying out the full programme, and we were obliged to postpone the pilgrimage to the latter place. It was one of those perfect mornings of which one dreams, but so seldom experiences elsewhere than in Asia Minor in midwinter. The sun was bright and warm, while the north wind was keen enough to stimulate to exertion, and the air so clear that the separate houses of villages at the base of Mount Latmos, fifteen miles away, could be easily distinguished. Our road lay southward, along the foot of Mycale, and doubtless was the same as that followed by the Ephesian elders on their journey to Miletus to bid farewell to St. Paul. In the swamps on our left, and in the canal-like depressions, through which the Maeandre once flowed, we noted large flocks of mallard ducks. Vultures were numerous over the brow of Mycale, and one pair of eagles was seen. In days gone by, francolins *(Francolinus vulgaris)*, were not uncommon here, but have now all but disappeared from the neighbourhood, and sportsmen have to be content with bags of such game as the red-legged partridges *(Caccabis chukar)*, woodcock, hares, quail, and snipe, and during rainy seasons, a wonderful variety of ducks. Wild boars are plentiful, and up in the mountains to our right leopards and bears are to be had, when the brigands are obliging enough to retire from their fastnesses, and allow some freedom of movement.

The road was rough and stony, but arriving at length at Priene, we spent some hours wandering about the old town and theatre, uncovered in a most systematic way by an agent of the Imperial Berlin Museum. On my first visit there in 1872, the centre of attraction was the remains of the temple of Minerva Polias, then recently excavated by Mr. Pullan, and reputed to have been the most artistically perfect Doric temple of the age.

Our conchological finds here were not so many as those at Magnesia. On the rocks of the Acropolis a variety of *Clausilia messenica* was abundant, and a brown *Clausilia*, related to *C. semidenticulata* Pfr., though not identical with the specimens of that species found on the previous day. Many dead shells of *Vitrea spratti* were found, but on that occasion no living ones. Then several specimens of *Helix cyclolabris* Desh., and *H. balmei* Pol., were discovered, the latter after prolonged digging under a great boulder. In the fields below the town, attached to a species of *Euphorbia*, the following were found in considerable numbers: *Helix acuta*, *H. syriaca*, *H. cartusianella* *H. cornea*, and another shell very much resembling the last-named, but clearly a different species In addition to these, we took *H. aspersa*, *H. pomatia*, *H. virgata*, *Buliminus pupa*, and *B. quadridens* The number of species found during the portion of the two days specially devoted to the search amounted to twenty-six.

The extremes of climate ruling in this part of western Asia Minor, especially the great dryness, and long duration of the summers, tend to a paucity in variety and number of molluscs. Such as do exist are somewhat difficult to find, for the animals generally take refuge under and in the deep recesses of rocks, where alone some moisture is found away from the few perennial streams.

Smyrna, 12th January, 1899.

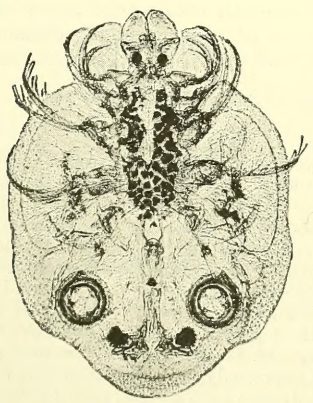
Pirula Nodulifera in North Kent.—It is not often that one has the good fortune to add to the fauna of so classical a section as that of the Lower London Tertiaries at Charlton. On a recent excursion to that place I unearthed a gasteropod of the genus *Pirula* from the Thanet sand. As it is merely a cast in sand, it is not easy to accurately identify; but Mr. R. B. Newton thinks it is probably the *P. nodulifera* of G. B. Sowerby. As far as I know. the only molluscan remains previously recorded from this locality are casts of *Arctica* (=*Cyprina*) and *Pholadomya*, the latter being frequently found by the workmen. At the time of my visit, there was exposed in the Blackheath pebble-bed a large mass of lignite, probably the remnant of some drift-wood which the sea had once cast up on this ancient beach.—J. P. Johnson, *The Glen, Glengarry Road, East Dulwich, S.E.*

FISH-LICE.

By Frederick Noad Clark.

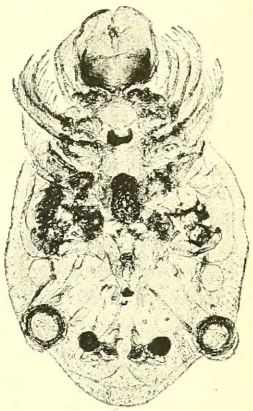
THE creature, *Argulus foliaceus*, here illustrated belongs to the sub-division Entomostraca of the class Crustacea, and is commonly known as the fish-louse. It is found parasitic on most of our fresh-water fishes, notably the pike, carp, roach, and stickleback. It was from the latter hosts I obtained my specimens. The life history of *A. foliaceus* is still somewhat obscure, but I have had the good fortune to observe its habits from the ova to nearly an adult stage.

The grounds of the Paddington Infirmary occupy a portion of the left bank of the Grand Junction Canal, and being upon that side on which the barges do not touch, the bank and surrounding vegetation are still in a wild and unmolested state of nature. Here, in the summer months, may be found large numbers of the smaller dragon-flies, *Agrion*, etc., as well as several species of aquatic hemiptera, such as *Nepa* and others. It was here, in the latter part of April 1896, that the sticklebacks were in abundance. My attention having been drawn to some "insects" infesting these fish, an examination found them to be the parasite *Argulus foliaceus*. For the past year or so I have been unable to procure any specimens, owing to the scarcity of the sticklebacks, due probably to the increased pollution of the canal. In the year mentioned, both host and parasite were numerous, and now, when unable to procure material, one regrets lost opportunities. About one in every four or five fish examined was found to have an *Argulus* attached, and in some cases two or three.



Argulus foliaceus.—Female. × 12.

The favourite position of attachment is the posterior parts of the body of the fish, although I have found them in the neighbourhood of the gills, and in one case upon the eye itself. No difficulty is experienced in detaching the parasite. This done, it commences to swim with a darting motion, turning somersaults in the water at intervals. Very noticeable, too, is the incessant motion kept up by the swimming feet, whether at rest on the side of the glass vessel in which it was kept, or when in pursuit of its prey. I have observed, on several occasions, a fish to take the parasite in its mouth, but shortly afterwards to eject it uninjured.



Argulus foliaceus.—Male. × 20.

In size the adult female *Argulus* is from five to six millimetres in length, and from three to four millimetres in breadth—the male being much smaller. The females were the more numerous, and could readily be identified by the presence of two black spots, one on each lobe of the abdomen. This animal is of a slightly greenish colour, and almost transparent. On the ventral surface are situated the feeding and locomotive organs, the dorsal surface being somewhat convex in shape. The apparatus for attachment to its host is seen to be very perfect for the purpose. In addition to an armament of spines, which covers the under marginal surface of the carapace, attention will at once be drawn to the pair of "suckers," that, at first sight, are not unlike the pro-legs of lepidopterous larvae. These are short, fleshy, cylindrical appendages, with a ciliated margin. They are provided with powerful muscles which contract at will, so forming a pneumatic sucker, and thus enable the parasite to firmly adhere to the smooth surface of the fish. The eyes are of a dark-purple colour; they will be observed a little in front of the suckers, but nearer to the middle line, and resemble in some degree the compound eyes of insects. The antennae are situate close to the eyes, and consist of two joints terminating in a pointed hook, together with a three-jointed appendage, which has been described by some

writers as a second pair of antennae. The organs of the mouth lie about the centre of the carapace, and are of a complex character. The prominent feature is a prehensile tube, having a sharp point. This tube is capable of being sheathed, or moved in any direction by its possessor, the movements being so quick as to be observed only with difficulty. At the base of this organ will be found two pairs of rudimentary maxillae. On either side of the mouth is a pair of foot-jaws, called prehensile feet by Dana and Merrick; they have five joints and are of a cylindrical shape with three hooks on the terminal joint; these are partially covered with short spines, and have at their base four chitinous teeth. Baird, in his "Natural History of the British Entomostraca," says these organs have two hooks.

Below the foot-jaws, and arising from the lower middle portion of the carapace, is the thorax, carrying the four pairs of swimming feet before referred to. Each of these has a fleshy base that is prolonged into two plumose branches of about equal length. Under a medium power these are seen to bear others, still more delicate. The stomach commences at the base of the mouth, and branches laterally under a large portion of the carapace. The abdomen is small, and situated at the lower end of the thorax, where it is terminated by two oval lobes, the use of which I am unable to ascertain.

In the female, previous to ovipositing, the whole space of the thorax, from the maxillae to the base of the abdomen, is seen to be full of ova, to the number of three hundred or four hundred eggs. The surface of the thorax of the females is dotted over with what I took to be pigment cells, but on this point I should be glad to have confirmation, as I noticed the cells to exist only on that sex.

My observations on a captive female, which I had kept in a test glass, showed the ova deposited on the side of the glass, and cemented together in one layer of regular rows; they were of a pale-yellow colour. The time occupied from the deposition of the ova until hatching was twenty-four days. Every egg proved fertile, but I was unable to keep the young alive more than a few days, due doubtless to the artificial conditions of their surroundings.

The metamorphosis from young to adult stage is not very marked, except in the development of the swimming-feet, which, in the young, are quite rudimentary, and in the suckers, which are absent in the very young, and do not appear to be developed until several days after birth. In the absence of these suckers, however, the animal is provided with two pairs of bristle-like organs that probably take the place of the swimming-feet, until these are further developed, when they then disappear. The eyes are well in evidence, even in the earliest stage. Some adult specimens which I kept died at the end of fourteen days after separation from the stickleback. During growth, moulting took place very frequently, the exuviae retaining the form of the parasite in a very perfect manner. This is shown in a specimen I have preserved. Many of the adult *Argulus* were found to have attached to them numbers of Vorticellae, especially in the region of the mouth. I preserved several specimens by mounting in Farrant's medium, and hope at some future time, when material is obtainable, to study further this most interesting parasite.

The illustrations, representing the ventral aspect of both male and female of *A. foliaceus* are from photographs I took of specimens under my own observation.

Paddington Infirmary,
Harrow Road, London, W.

LEPIDOPTERA IN SOUTH-EAST ESSEX.

By F. G. Whittle.

(*Continued from page* 301.)

Geometrae.

THERE is quite an average number of species of the Geometrae to be found in the South-Eastern portion of Essex. I can myself account for 102 different species, and others will doubtless be found in the district. By far the most characteristic and interesting moth is our local *Phorodesma smaragdaria*, once so rare a moth in this country. *Acidalia ochrata* was taken some fifty years ago by the late J. B. Hodgkinson. In recording it, he mentioned the rough hospitality of the people of Prittlewell, who were unused to visits from strangers. This is much the reverse now.

The following I have myself taken in South-east Essex.

Uropteryx sambucaria. Southend and Eastwood.

Epione apiciaria. Prittlewell; not common.

Rumia luteolata. Everywhere abundant.

Venilia macularia. Eastwood; common.

Angerona prunaria. Eastwood; scarce. Mr. Carrington has taken this species among blackthorn on the slopes east of Leigh.

Metrocampa margaritaria. Southend; not common.

Selenia bilunaria. Spring emergence, common.

Crocallis elinguaria. Benfleet and Eastwood adult larvae common on blackthorn in May.

Eugonia autumnaria. I have seen a specimen of this insect which was taken last year at Shoeburyness. The captor, who is quite a beginner, believes he took it at sugar. *E. alniaria* and *E. fuscantaria,* Southend, at light; not common. *E. quercinaria.* Southend; not common.

Himera pennaria. Southend at light; not common.

Phigalia pedaria. Southend; scarce.

Biston hirtaria. Southend; scarce.

Amphidasys betularia. Southend; scarce.

Hemerophila abruptaria. Southend; rather common.

Boarmia repandata. Southend; larvae on elm. *B. rhomboidaria,* Benfleet.

Pseudoterpna pruinata. Eastwood; scarce.

Phorodesma pustulata (=*bajularia*). Eastwood; not common. A larva of this insect was, quite unknown to me, in my umbrella. Had it not attempted to escape, its clothing of fragments of the food-plant would have effectually protected it and deceived me. It is as admirably concealed as is its congener, the following fine species. *P. smaragdaria.* This insect is, as all moth collectors know, closely identified with Southend and the neighbouring salt-marshes. Its discoverer in this country was Christopher Parsons, of Southchurch, near Southend, who having found the caterpillar, bred the first moth, 30th June, 1826. (See John Curtis' "British Entomology," vol. 7, plate 300.) A writer in the "Essex Naturalist" states that so rare was this moth that for a time it was valued at the rate of £7 per specimen. From being an exceedingly rare insect it may be now classed as a locally common one, and this is solely due to the fact that its life-history has been made known, with the result that any collector bent upon finding the species can, with a little perseverance, count upon getting his series without much labour. With us, the larvae hatch out in July, feed until October, hibernate, pupating about the middle to end of May. The imago appears about middle of June, and is, as far as I know, attached to one food-plant only, that being *Artemisia maritima.* One is, I think, pretty safe in assuming that this is not a delicate caterpillar. It is usually found well below the level of the river drift and must, consequently, be often under water at high tide, during its existence of about ten months. I should be very pleased to hear from any readers of SCIENCE-GOSSIP who can tell me as to the habitat of this insect on the continent of Europe. I have seen several Continental records, and know that the moth has been reported from Switzerland up to an altitude of 4,000 ft.; also that larvae have been reared on salad-burnet, tansy and yarrow; but I should like to know if larvae have ever been found on the Continent in any habitat resembling that favoured in this neighbourhood.

Iodis lactearia. Eastwood; common.

Hemithea strigata. Benfleet, Eastwood, Leigh and Southend; common.

Asthena luteata. Eastwood; not common. *A. candidata,* Eastwood; very common.

Acidalia dimidiata. Shoebury, Southend, Leigh Benfleet and Vange; common. *A. bisetata,* Eastwood; common. *A. trigeminata,* Eastwood; scarce. *A. dilutaria,* abundant on the river wall. *A. virgularia,* Southend; common on fences. *A. marginepunctata,* Leigh and Southend; often taken at light; occurs freely on Southend side of South Shoebury Coast Guard Station; earliest date 12th May, latest 16th September. *A. subsericeata,* Benfleet, Leigh and Southend; fairly common. *A. immutata,* Canvey, Benfleet, Leigh; very common. *A. remutata,* Eastwood; common. *A. imitaria,* Leigh and Benfleet; not common. *A. emutaria,* Shoeburyness and Benfleet; uncommon. Specimens taken in this district have a delicate pinky flush. *A. aversata,* Southend, Benfleet and Eastwood; common. *A. emarginata,* Leigh and Benfleet; not common.

Timandra amataria. Southend, Leigh, Eastwood; not common.

Cabera pusaria. Eastwood. *C. exanthemata,* Southend and Eastwood.

Bapta temerata. Eastwood; not common.

Aleucis pictaria. Southend and Leigh; scarce.

Strenia clathrata. Shoeburyness, Prittlewell, Leigh and Benfleet; common.

Panagra petraria. Eastwood.

Numeria pulveraria. Eastwood; not common.

Aspilates ochreata. Shoebury, Southend, Leigh and Eastwood; still a common insect.

Abraxas grossulariata, everywhere; not much variation.

Ligdia adustata. Prittlewell.

Lomaspilis marginata. Eastwood and Hockley; very common.

Hybernia rupicapraria. Southend; abundant. *H. leucophearia,* Eastwood. *H. aurantiaria,* Eastwood; common. *H. marginaria,* Southend. *H. defoliaria,* Eastwood.

Anisopteryx aescularia. Eastwood and Southend.

Cheimatobia brumata, abundant everywhere.

Oporabia dilutata, very common all over the district.

Emmelesia alchemillata. Eastwood; not common. *E. unifasciata,* Leigh; not common.

Eupithecia linariata. larvae at Leigh; not common. *E. oblongata,* the commonest pug in the district. I once found a larva on a flower of sea-wormwood, and was almost persuaded that the Hunstanton insect, *E. extensaria,* had travelled to Southend. *E. subfulvata,* Leigh; Benfleet and Southend at light. *E. scabiosata,* Shoeburyness; not common. *E. plumbeolata,* Eastwood; not uncommon. *E. castigata,* East-

wood; not common. *E. subnotata,* Shoeburyness and Benfleet; larvae common on *Atriplex*. *E. vulgata,* all over the district. *E. absynthiata,* Benfleet. *E. tenuiata,* Eastwood; bred from sallow catkins. *E. abbreviata,* Eastwood; not common. *E. dodoneata,* Southend; not common. *E. pumilata,* abundant. *E. coronata,* one specimen only on a fence at Leigh. I hardly expected to get this insect, as there is very little clematis in the immediate neighbourhood. The plant grows on the Hadleigh Castle slopes, and very freely in some of the lanes between Eastwood and Shoeburyness. *E. rectangulata,* Southend; at light and on fences.

Lobophora carpinata, Eastwood; not common.

Hypsipetes sordidata, Benfleet and Eastwoood; bred from sallow.

Melanthia ocellata and *M. albicillata,* both scarce at Eastwood.

Melanippe hastata. Eastwood; scarce. *M. unangulata,* Hockley; scarce. *M. rivata,* Eastwood; not common. *M. sociata,* Eastwood, Leigh and Southend; common. *M. montanata,* Southend, Prittlewell and Eastwood; abundant. *M. fluctuata,* everywhere very common.

Coremia ferrugata and *C. unidentaria,* both these moths are generally common.

Camptogramma bilineata, very common.

Eucosmia undulata. Eastwood; not common.

Cidaria miata. Southend; at light. *C. corylata,* Eastwood and Hockley; rather common. *C. truncata,* Southend; at light. *C. testata,* Eastwood; not common. *C. dotata,* Benfleet; not common.

Pelurga comitata. Southend; not uncommon.

Eubolia cervinata. Southend; common at light. *E. limitata,* common on the river wall and slopes; larvae on *Vicia*. *E. bipunctaria,* common, though far away from the chalk.

Anaitis plagiata. Southend and Benfleet; common.

Chesias spartiata. Eastwood, common; Southend at light.

(*To be continued.*)

BRITISH FRESHWATER MITES.

By Charles D. Soar, F.R.M.S.

GENUS *CURVIPES* KOENIKE.

(*Continued from page* 293.)

VI.—*Curvipes conglobatus* Koch., 1835-41.

Female: Body.—Oval in form. Length about 0·92 mm. Width about 0·68 mm. Although a smaller mite than any of the preceding species, it has very strongly marked dermal glands on the dorsal surface (fig. 26). I do not know of any other species of *Curvipes* that shows these glands in so conspicuous a manner. Colour varies. Body generally a reddish yellow, with brown markings and a light yellow T-piece (fig. 26) in centre of back.

Legs.—First pair are about 0·80 mm. in length Each pair gradually gets longer, the fourth pair measuring about 0·98 mm. In colour they are generally blue, but I have found some where the legs have been green, inclining to red at the tarsi. The legs in actual structure are about the same as in other members of this genus, but have not quite so many hairs as some of those already mentioned.

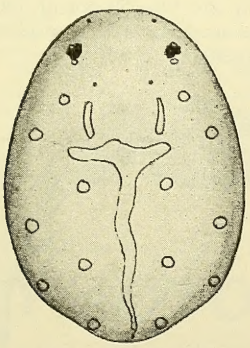


Fig. 26, *C. conglobatus.*—Female, dorsal surface.

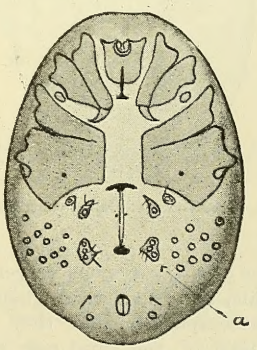


Fig. 27, *C. conglobatus.*—Female, ventral surface.

Epimera.—This is about same shape as *C. uncatus,* but larger in proportion to size of the body (fig. 27). The posterior angles are not so pointed as in *C. fuscatus.* In colour they are the same as the legs.

Palpi.—About 0·26 mm. in length. The inside surface of right-hand palpus is represented by fig. 28.

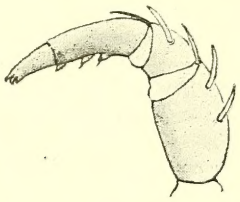


Fig. 28, *C. conglobatus*.—Inside surface of right palpus.

Genital Area.—From fig. 27 it will be seen that the chief point of identification lies in this part, when compared with those species of this genus already noticed. There are four small plates, two on each side of the fissure. In some cases I cannot find the posterior plates at all, as they do not appear to be developed; but the three discs are generally there and close together (fig. 27-*a*). The number of independent discs varies in different specimens, as is usual, but as a rule they are about ten on each side.

Male.—Smaller than female, measuring about 0·60 mm. in length. Fig. 29 shows the ventral surface of the male. In colour it is about the same as in the female, but generally a little darker

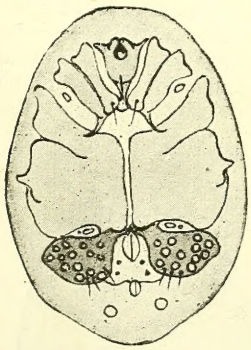


Fig. 29, *C. conglobatus*.—Male, ventral surface.

in tone. The eyes appear much larger than those of the female, and the dermal glands are also much more conspicuous than they are in that sex. The tarsi of the third pair of feet have the claws so small as to render their observation a matter of difficulty, though the tarsi have the appearance of having been cut through.

Nymph.—On the ventral surface of the nymph stage of this mite, it will be noticed (fig. 30) that the nymphs, with few exceptions, have only two genital suckers on each side of the median line. The genital fissure in this stage, with few exceptions, is not developed at all in these nymphs. I have taken two specimens of this particular mite showing an inert stage between the nymph and the imago. They were found attached to an aquatic plant in a small pond in Folkestone

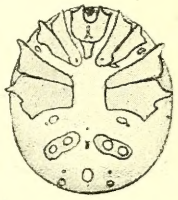


Fig. 30, *C. conglobatus*.—Nymph stage.

Warren. Each was enclosed in a transparent integument; so transparent was this protecting skin that the whole of the mite could be seen within and the species recognised.

Localities.—*Curvipes conglobatus* is very common. I have taken it in nearly every collecting excursion round London, also in Suffolk, Derbyshire, North Wales, Kent, Sussex, and Berkshire. I have had several sent to me by Mr. George, of Kirton-in-Lindsey, Lincolnshire.

VII.—*Curvipes obturbans* Piersig.

Female.—Body oval. Very much like fig. 27 in outline. Length about 1·28 mm.. Width about 1·0 mm. Colour a dark yellow with brown markings on the dorsal surface.

Legs.—First pair about 0·88 mm. in length; the fourth pair being about 1·12 mm. Colour a slaty-blue, sometimes inclined to yellow. There is not anything sufficiently characteristic to need a figure of these limbs.

Epimera. — About the same in shape as in fig. 27. They are blue in colour, like the legs. All the chitinous parts in this species are generally of a slaty-blue.

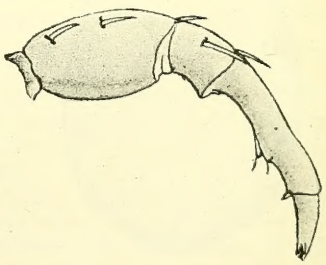


Fig. 31, *C. obturbans*.—Female, inside surface of left palpus.

Palpi.—About 0·52 mm. long. Two pegs are very plainly seen (fig. 31) on the bow edge of the penultimate joint.

Genital Area.—As is usual, it will be seen this is the chief point of identification. The

IMPORTANT NOTICE.

SCIENCE-GOSSIP.

CHANGE OF ADDRESS TO 110, STRAND, LONDON, W.C.

WE have pleasure in informing the readers, subscribers and advertisers in "Science-Gossip" that the proprietor of this Magazine has taken an independent office at 110, Strand, London, W.C., at which editorial and business arrangements will in future be carried on. This places "Science-Gossip" in the unique position of being the only scientific magazine having its own premises

Would you kindly enter this change in your address-book.

In consequence of the introduction of further capital, and the independent position of the magazine, the readers will in future find considerable improvement and additions in the literary matter. Those departments which in the past have been especially attractive will be still further developed. "Science-Gossip" will continue to be the organ of the field-naturalist as hitherto, but full space will be given, as has latterly been the case, to the modern aspects of biology.

More attention is being paid to the physical side of science, including monthly notes, and a series of articles upon new and useful physical apparatus, by Mr. James Quick, whose professional position renders him a specialist on the subject.

Under these circumstances we appeal to our present large circle of readers and supporters to assist this improvement and development of "Science-Gossip," by extending the circulation through new subscribers, or even by mentioning the magazine to friends and acquaintances who do not already take it. Subscriptions, 6s. 6d. per annum including postage, may commence at any time.

As "Science-Gossip" has now an independent office, the Editor is glad to make the personal acquaintance of his contributors and subscribers, and for that purpose has set aside the afternoon on Thursdays, from 4 to 6 p.m., at this address, when he will be pleased to see any, especially contributors and readers from the country, who may happen to be in London.

The Editor begs to again remind the readers how valuable to others are short notes upon apparently trivial subjects, for what are familiar matters to the writer are frequently important though little-known facts.

The Editor will in future, as during the past two years, have the co-operation in the editorial department of Miss F. Winstone as assistant editor.

110, Strand, London, W.C.
Christmas, 1898.

plates are sickle-shaped with a few hairs (fig. 32) on the anterior and posterior ends. The discs vary in number in different species, and are found in varying quantities from twelve to twenty-five on each plate; besides which, there are found one, two, or three free discs outside the actual plate

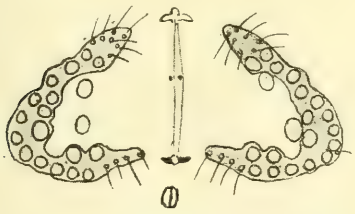


Fig. 32, *C. obturbans*.—Female, genital area.

embedded in the skin. The form of this plate is quite sufficient to identify this from any other species previously mentioned in this genus.

Male.—Length about 1·0 mm. Very much like fig. 29 on the ventral surface, and in the form of the genital plates. The dorsal surface has dermal glands, but very faintly marked, not in any way so prominent as those on *C. conglobatus*. This last feature alone is sufficient to allow of identification in the male of this species.

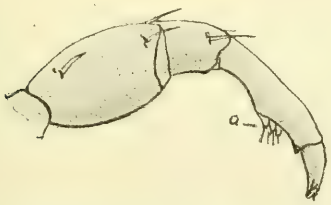


Fig. 33, *C. obturbans*.—Male, inside surface of left palpus.

Palpi are rather different from those of the female, having several pegs at one place (fig. 33-*a*), which give that part of the palpus a thickened appearance.

Localities.—It is a rather common species. I have taken a great many specimens on various collecting excursions.

Piersig, in his work, describes a mite which appears to be very much like this species. It is named *C. rotundus*, of Kramer; but I have not been able to identify it in Britain.

VIII.—*Curvipes carneus* Koch, 1835-41.

Female: Body.—Oval, very much like *C. uncatus* Koenike (fig. 15). Length about 2·5 mm. Breadth about 1·70 mm. It is of a dirty brown colour, with markings of a much darker brown.

Epimera.—Small in proportion to the ventral surface, but it is so much like fig. 15 that another figure is not necessary.

Legs. — Exhibit no marked difference from those of other species of *Curvipes* previously noticed. First legs about 1·60 mm. in length fourth legs about 2·0 mm. All the chitinous parts of this mite in colour are a pale dirty-brown or dirty-yellow

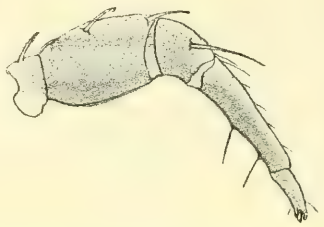


Fig. 34, *C. carneus*.—Male, inside surface of left palpus.

Palpi.—Very small in proportion to length of body (fig. 34), being only 0·56 mm. in length, and very weak in structure. The pegs on the bow side of the last joint but one of the palpi are so small as to be almost unnoticed under a low power; but the tactile hairs which spring from these pegs are long and conspicuous. It will be noticed that although the palpi of *C. carneus* have the general structure similar to all the others of this genus, the bow part is quite different from any of the others I have figured.

Genital Area.—Very much the same as in fig. 15, but the plates on which the discs or suckers are situated are more rounded in shape. The number of discs on each plate varies very much, but the mean number seems to be about twenty.

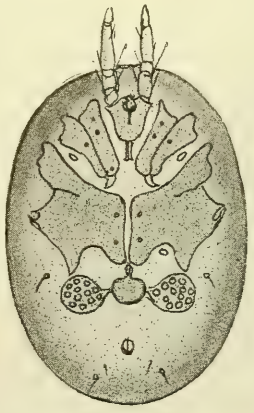


Fig. 35, *C. carneus*.—Male, ventral surface.

Male.—Length about 1·80 mm. (fig. 35).

Epimera are quite a different shape from any of those previously noticed in *Curvipes*. The plates are very small in proportion to size of body; the back pair are very much bent on the posterior margin, and sharply pointed.

Genital Plates are nearly circular, similar to those of the female.

Palpi are like those of the female, as shown in fig. 34, with the exception that there is another very short tactile hair between the two long ones.

Localities.—This mite is not common. I have only taken about eight specimens in four years.

IX.—*Curvipes ambiguus* Piersig, 1894.

There is some doubt about this mite, Piersig having named it from the nymph. It curiously has three discs on each plate, whereas all the other nymphs of this genus known at present have only two.

Genital Area.—Fig. 36 will show the arrangements of the genital plates.

Fig. 36, *C. ambiguus*.—Genital area of nymph.

Localities.—Having found the nymph myself at Staines in 1895, it should be included in our British list.

(To be continued.)

SUCCULENTS AT KEW.

By E. H. Wilson.

A FORMAL introduction to my subject seems unnecessary, since the Succulent House is so well known to all frequenters of the Royal Gardens at Kew. Many are probably more interested and amazed at the marvellous collection of plants grouped together in this house, than in any of the other departments of the gardens. It would seem at first sight as if the authorities had determined to group together in this structure all the prodigies of plant life. The variety in form seems endless and infinite. The enormously thick leaves and terrible spinescent apices of the American aloe (*Agave*), the columnar stems of giant cacti armed with stout, horny spines, the huge candelabra Euphorbias, the remarkably articulated stems of the "prickly-pear" (*Opuntia*), covered with short, barbed spines, and many other curious and grotesque plants combined, have earned for this house the seemingly appropriate name of the "Chamber of Horrors," a name which has clung tenaciously to it for well-nigh half a century.

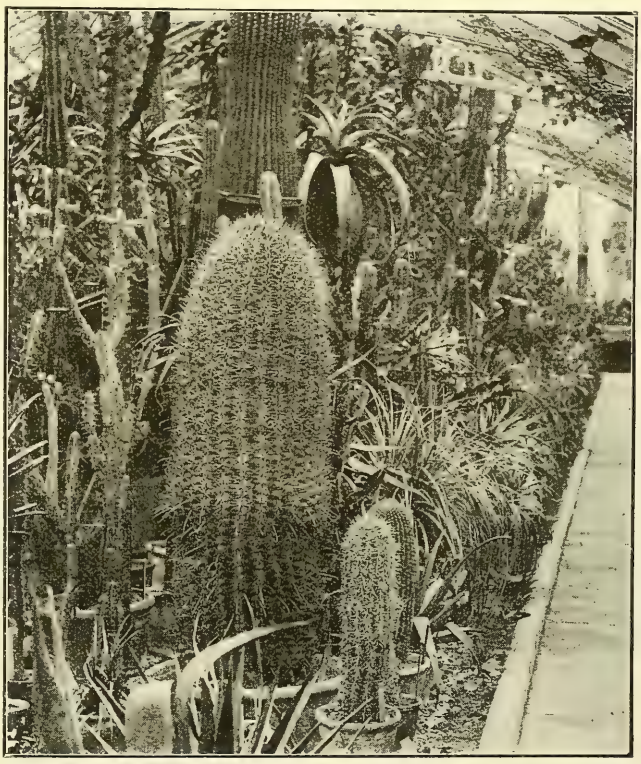
The whole aspect of this house is so totally different from its neighbours that it cannot fail to attract and impress even the most casual observer. To the average visitor it is simply a museum of vegetable curiosities. To the gardener, the gorgeous and beautiful flowers of *Phyllocactus* and *Epiphyllum*, the great white flowers of the "night-flowering Cereus," often a foot in diameter, and the graceful habit of species of *Asparagus*, will strongly appeal, if other things fail. To the botanist, the whole house is a veritable treasure-trove. The entire collection is one huge demonstration of that marvellous phenomenon known as plant metamorphism. Nearly every species shows the same organs modified in diverse ways and in varying degrees, all apparently with the object of better subserving their function in the plants' economy and aiding in ensuring the perpetuation of the species. As an evolutionist the botanist here finds some of the strongest evidence extant of adaptation of plants to environment.

Practically all the inhabitants of this large house (200 ft. by 30 ft.), are xerophytes—that is to say, plants which inhabit dry regions. As one would naturally expect, we find xerophytic representatives of many different families of plants, but the great majority belong to the following seven natural orders: Liliaceae, Amaryllideae, Cactaceae, Euphorbiaceae, Crassulaceae, Asclepiadeae, and Compositae. Nearly every arid region of the tropical and sub-tropical parts of the globe is represented by the plants in this house; but the majority are concentrated in two widely-separated geographical areas, of South Africa on the one hand, and Mexico, Texas, Arizona, and Peru on the other. To the former belong the majority of the Liliaceae, Euphorbiaceae, Crassulaceae, Asclepiadeae and Compositae; to the American continent the Cactaceae and Amaryllideae. The insular flora of the Canaries is well represented by various species of *Sedum*, *Crassula*, and *Euphorbia*. Of the remainder, Abyssinia, Somaliland, and Australia claim a share. Particularly noteworthy are the grass-trees or black-boys (*Xanthorrhaea*) of Australia. The prickly pear, and American aloe, have been largely introduced and planted in the Canaries, Mediteranean region, India, and South Africa. The former is esteemed by many for its fruit, which is acid and pulpy; but in the Canaries the plant is used as food for the cochineal insect. The aloe yields valuable fibre, and is cultivated for this in India.

In the regions enumerated, the average rainfall is very small, and in parts of Mexico rain may not fall for two or three years. Any plant to exist under such adverse conditions must certainly possess special and peculiar structural adaptations whereby transpiration or loss of water, due to the action of the sun's rays, is reduced to a minimum.

Further, it would be a decided advantage if the plant was able to store up water in its tissues for its use in times of excessive drought. These two facts furnish the clue to the whole phenomenon; all the variations in the vegetative structure are means towards this end. For the prevention of excessive transpiration in these plants, we almost universally find a very thick cuticle and stomata sunk below the surface. A coating of wax which is frequently present on stems and leaves, is another means towards this end. The water-storage is provided for by the thick, fleshy leaves and stems, the central portions of which consist of colourless cells containing aqueous fluid.

These points may be illustrated more clearly if I refer to some examples which show how such organs as leaves whose functions are essentially transpiratory and assimilatory, are variously modified, and even superseded, appearing only as spines (*Opuntia*), bristles (*Epiphyllum*), or minute scales (*Asparagus*). Correlated with the reduction of foliage, we find an extension of stem-structure, becoming winged, flattened, columnar, candelabra, and some other forms.



J. Gregory VIEW IN SUCCULENT HOUSE AT KEW. *Photo. Croydon.*

In the Cactaceae, beginning with the genus *Pereskia*, we find a normal, woody stem clothed with venomous spines, and producing fairly normal leaves. In *Epiphyllum*, the stem is flattened and articulated, the leaves being represented by a few bristles. In *Phyllocactus*, the stems are flattened, and free from the slightest vestige of a leaf. In *Rhipsalis*, some species have flattened, others cylindrical stems. In all the above genera, the stems are only slightly succulent as compared with their desert allies, for the simple reason that, with the exception of *Pereskia*, they are all epiphytes, growing on ordinary, broad-leaved, dicotyledonous trees—trees, that is, which could not exist unless the rainfall was fairly liberal. Thus we see that these plants are structurally correlated with their more genial environment.

Next we will consider the typical desert forms, and in these we shall quickly observe highly specialised modifications. In *Opuntia* the stems are flattened and articulated; in *Mamillaria*, thick and cylindrical, covered with conical protuberances (mamillae), terminated with a cluster of spines. In all the other genera, they are more or less triangular or columnar. All of them are variously ridged or grooved, and vary from an inch (*Cereus rostratus*), to two feet or more in diameter, as in *C. giganteus*. The bulk of the tissue serves as a reservoir for water, assimilation being relegated to the peripheral layers of cells. These stems are armed with spines of varying size, giving them a very formidable appearance. In *Echinocactus wislizeni* they are nearly four inches long, bent round at their apical portion in the shape of a fish-hook, hence the name "fish-hook cactus." The spines not only protect them from herbivorous animals, but aid in breaking the incidence of the sun's rays.

In the old-man cactus (*Cereus senilis*), and the grizzly-bear opuntia (*Opuntia senilis*), the whole stem, and particularly the apical portion, is thickly covered with long, silvery-grey hair. The Turk's-cap cactus (*Melocactus communis*), is very interesting, the top of the stems being crowned by a big, shaggy cap. In large specimens this may attain a size of two feet in circumference. It is formed by the aggregation and persistence of tufts of woolly hair which are developed around the ovary of each flower.

(*To be continued.*)

ARMATURE OF HELICOID LAND-SHELLS
AND NEW FORMS OF PLECTOPYLIS.

By G. K. Gude, F.Z.S.

(*Continued from page* 240.)

Plectopylis giardi (figs. 95*a-e.*), from Cao-Bang, Tonkin, was described and figured by Dr. H. Fischer in the "Bulletin Scientifique de la France et de la Belgique," xxviii. (1898), p. 320, t. 17, ff. 17-21. The shell is dextrous, very deeply and rather widely umbilicated, brown, finely striated, and decussated with microscopic spiral lines above. The spire is depressed, conical, the apex prominent and the suture distinctly impressed. There are eight whorls, which increase slowly and regularly and are somewhat flattened above and tumid below; the last rounded, obsoletely angulated

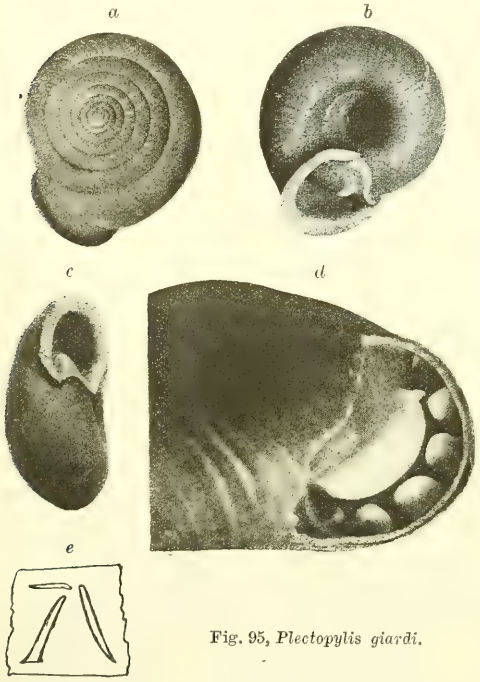


Fig. 95, *Plectopylis giardi.*

above the periphery, descends shortly and suddenly in front. The aperture is oblique, subcircular; the peristome white, rounded, much thickened and strongly reflexed, its margins being united on the parietal callus by a strongly thickened and raised flexuous ridge, which is slightly notched at the junctions above and below. Near the apertural ridge occurs a short but strong oblique fold. (See figs. 95*a* and *c.*) The parietal armature consists of two strong obliquely divergent vertical plates, the anterior one shorter, with a slight support on each side at the lower extremity; a short, thin, horizontal fold occurs immediately above it; the posterior one longer, somewhat attenuated at the lower extremity but rather truncated above. (See fig. 95*e*, which shows part of the parietal wall with its armature). The palatal armature consists of six short folds: the first thin, horizontal, near the suture; the next four stronger, semicircular, more or less oblique, and intercalated between the two vertical parietal plates; the sixth long and thin. The second of these folds is nearly straight, a little attenuated at both extremities, while the third, fourth, and fifth are almost vertical, reflexed anteriorly above and posteriorly below. *Plectopylis giardi* and the next species are allied to *P. schlumbergeri* figured in this series of papers (vol. iv., 1897, p. 138, f. 58), *P. jovia* (*ibid.*, f. 59), and *P. villedaryi* (*ibid.*, p. 139, f. 60), but can be distinguished at once by the double vertical parietal plate. I am much indebted to Dr. H. Fischer, who kindly allowed me to make use of the photographs of the type shells, which are copied in figs. 95*a-d.* Figs. 95*e* and *f* (enlarged) are from a specimen, one of three collected by Dr. Billet, obligingly furnished by Prof. Giard, and now in my collection. This specimen measures: major diameter, 20 millimetres; minor diameter, 17·5 millimetres; altitude, 12 millimetres.

Plectopylis congesta(1), figs. 96*a-f.* A shell received from Messrs. Sowerby and Fulton as *P. giardi* proved upon examination to differ from that species as well as from all other known forms of

( ) *Plectopylis congesta*, n. sp. (fig. 96*a-f*).—Shell dextrous, deeply and very widely umbilicated, dark corneous brown, somewhat paler below, finely striated and decussated with microscopic spiral lines which become obsolete below the periphery. Spire depressed, conical; apex prominent; suture slightly impressed. Whorls eight, rounded, increasing slowly and regularly, the last distantly ribbed, suddenly descending somewhat deeply in front; aperture oblique, subcircular. Peristome pale fuscous, thickened and reflexed; the margins united on the parietal callus by a strongly raised flexuous ridge, slightly notched at the junctions above and below. Parietal wall with a strong horizontal entering median fold, running parallel with the suture and united to the apertural ridge. Parietal armature consisting of a strong vertical plate, furnished above and below anteriorly with a slight ridge or support; viewed laterally this plate is seen to be slightly notched at the upper extremity; a second shorter and thinner vertical plate, the lower half of which is obliquely deflexed, occurs behind the first; the lower extremities of the two plates are united by a slight horizontal ridge. Palatal folds six; the first slight, horizontal; the second, third, fourth, and fifth semicircular, oblique; the sixth, horizontal. — Major diameter, 16-18·5 millimetres; minor diameter, 14-15 millimetres; altitude, 9-10 mm.—Habitat, Tonkin.—**Type in my collection.**

Plectopylis. Its exact locality, unfortunately, was not stated. It differs from *P. giardi* in being smaller, in having a wider umbilicus, in the whorls being less tumid and, as a consequence, the two sets of barriers are in close proximity to each other, so that less space is left for the body of the animal when extended out of the shell. The horizontal fold at the aperture is longer than that of *P. giardi*, and instead of being oblique, as in that species, it is parallel with the suture and is, besides, distinctly united to the apertural ridge. The principal difference, however, lies in the armature, the anterior parietal plate in *P. congesta* being longer than the posterior one,

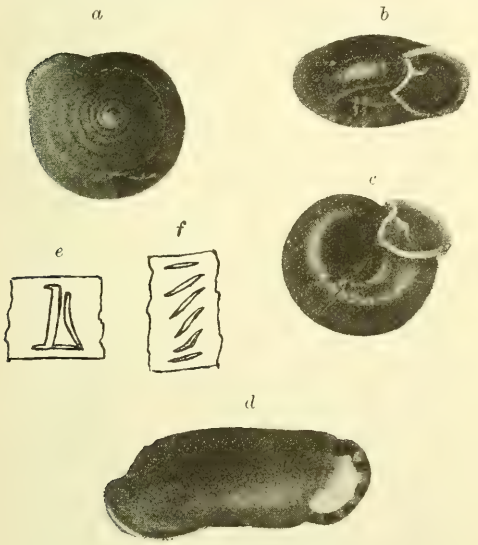


Fig. 96, *Plectopylis congesta*.

whereas the reverse condition obtains in *P. giardi*. Moreover, the horizontal fold above the anterior vertical plate of that species is absent in the present shell, while in its place occurs a horizontal ridge uniting the bases of the two vertical plates. The third, fourth, and fifth palatal folds are oblique instead of being almost vertical, as in *P. giardi*, and nearly straight instead of having their upper and lower extremities bent forwards and backwards respectively. The specimen shown in figs. 96*a-c* is in Mr. Ponsonby's collection. It measures 18·5 : 15 : 10 millimetres, while figs. 96*d-f* (magnified) are taken from my shell, the dimensions of which are 16 : 14 : 9 millimetres.

(2) *Plectopylis achatina* var. *repercussoides*, n. var. —This differs from the type in being angulated above at the periphery, also below round the umbilicus, and in the peristome being white. Armature same as in the type.—Major diameter, 25-27 millimetres; minor diameter, 19·5-22 millimeters; altitude, 8·5-9·5 millimetres.—Habitat, Burma.—Type in my collection.

The two foregoing species are connected by an intermediate form of *Plectopylis* still undescribed, but shortly to be published by Dr. Fischer, and which, owing to the kindness of Professor Giard, I was enabled to inspect. This interesting shell combines the characters of the parietal barriers of both the above species, having the two divergent vertical plates and the upper horizontal fold of *P. giardi*, as well as the lower horizontal fold of *P. congesta*. In its palatal armature it differs somewhat from both.

Plectopylis achatina var. *repercussoides* (2). In addition to the new forms described in my previous communications (*ante* pp. 115-133, *et seq.*), I possess a specimen which is intermediate between typical *P. achatina* and *P. repercussa*, having the contour and the white peristome of the latter, but the armature of the former. Thinking it undesirable to base a variety on a solitary shell, it was temporarily placed on one side. Since then Mr. W. E. Collinge has kindly sent me some shells of *Plectopylis* for examination belonging to the museum of Mason's College, Birmingham. Among these I found three specimens which are identical with my shell; all doubts as to its merits to rank as a variety are therefore removed. The variety *repercussoides* differs from the typical *P. achatina* in being angulated above at the periphery, and below round the umbilicus, resembling in this respect *P. repercussa*, with which it has also the white peristome in common. The armature is identical with that of the type. In colour the shell is chestnut brown above, while the umbilical region is white, a feature it shares with the variety *infrafasciata*.

(To be continued.)

SATURN'S NINTH MOON.

It is announced that Prof. W. Pickering, brother of the director of the Lowell Observatory at Harvard University, has taken several photographic plates of the planet Saturn, which show a ninth satellite, hitherto unknown to astronomers. The photographs were taken with the Catherine Bruce telescope, at the Arequipa Observatory, in Peru. This "new" moon is three-and-a-half times more remote from Saturn than Iapetus, the outermost known satellite. The nearest moon to that planet is Mimas, distant 117,000 miles, and having a revolution period of 22 hrs. 37 min. and 5·7 sec. Iapetus is distant 2,225,000 miles, with a revolution of 79 dys. 7 hrs. 54 min. 17·1 sec. The new unnamed moon has a period of revolution of seventeen months. The Americans with their fine instruments, and brilliant atmosphere, are becoming the leaders in the science of astronomy.

MARKINGS OF THE HORSE TRIBE.

By Wilfred Mark Webb, F.L.S.

SOME years ago Dr. Ewart, Regius Professor of Natural History in the University of Edinburgh, began to make a series of experiments in order to throw light upon the vexed question of telegony. This last word was coined to express the supposed inheritance of the characteristics of the dam's first mate by her offspring to a second sire. The case, which, as Professor Ewart says, breeders quote in support of the theory with "tiresome unanimity," has reference to a mare belonging to Lord Morton, early in the century. This nobleman wanted to breed quaggas, which have since become extinct, but he could only obtain a male example, and he mated it with a chestnut mare of seven-eighths Arabian blood that had not previously been bred from. A striped hybrid filly was produced, and its mother, after she had passed into the possession of Sir Gore Ouseley, bore two foals to a fine black Arabian horse. The point of the story is that the pure-bred filly and colt were marked more strongly than the quagga hybrid, and, it should be added, even bore stripes in places where there were none in the quagga, to whose influence they have always been attributed.

Professor Ewart has tried to repeat as nearly as possible the features of Lord Morton's case. Quaggas being non-existent, the work was begun with a zebra stallion belonging to the variety known as *chapmani* of *Equus burchelli*. As the experiments have proceeded, the results, together with many facts collected in their elucidation and the conclusions suggested, have been published at various times and in several places. Professor Ewart has now reprinted his papers and written an introduction, which together form a book under the title of the "Penycuik Experiments" (1). One would say that, although we may owe a volume produced in this way to the minimum of labour it imposes on the author, yet at the same time it causes a maximum of trouble to the student who wishes to obtain a clear idea of the position arrived at. It is little use making the valuable suggestions and facts with which the book is brimful, for there is no index to enable one to refer to them again. The only course to adopt is one which takes a good deal of time, and that is to make references as one reads the book to such pages as one would wish to find again.

To begin with, the author says (p. lxviii.): "I do not by any means say that telegony is impossible," but, all the same, he thinks that it has not been demonstrated experimentally, and that it is "as improbable as the almost equally common belief that the colour of the offspring may be influenced by 'maternal impressions,' as Laban's sheep and cattle are said to have been influenced by the peeled wands of his son-in-law Jacob."

Furthermore, Professor Ewart prefers to consider that Sir Gore Ouseley's colts (p. lxix.) did not owe their stripes to telegony, and everywhere suggests that these were due to atavism or ordinary reversion to an ancestral type. This conclusion is arrived at not merely from a consideration of the animals themselves, but also of the many zebra-horse hybrids which have been bred at Penycuik. The following numbered paragraphs give evidence in support of the contention:—

(1) It is fairly well established that the ancestors of the horse were striped, and Professor Ewart adds to our knowledge (pp. 105-110) of the markings which occur commonly on the legs, occasionally on the bodies, and rarely on the foreheads of *Equus caballus*, the domestic horse. Further, a point which has not been sufficiently investigated is the occurrence, particularly in young Arabs, of distinct stripes, which, however, do not often persist after the second year.

(2) The markings of the zebra-horse hybrids do not, when compared in detail with those of their father, agree at all with them. The almost necessary assumption is that the patterns of the young ones must have come either from the less remote ancestors of the zebra, or from the common ancestors of all the Equidae (p. 134). Compare the stripes upon the head of father and son in the illustrations, kindly lent by the publishers, which form figs. 19 and 20 in Professor Ewart's book; the markings make parted arches in the first, and circular ones in the second. Again, on the neck, the zebra has but twelve stripes, on the sides less than ten, while the hybrid has twenty-four and forty-three respectively.

(3) Lastly in this connection, the second foals produced to horse sires in 1898 by the mothers of the hybrids of 1897, show no features that can be traced to the zebra sire; the first (p. lxxii.) resembles its skewbald Iceland mother, inbred and, therefore, prepotent; the second (p. lxxv.) takes after its father, its other parent not being inbred; while the third, though for a few months showing indications of such stripes (p. lxxvi.) as occur in young horses, differs in no way from the generality of pure-bred foals.

The word 'prepotent' was used just above, and it should be mentioned that (p. xl.-xli.) prepotency may have a great effect in such experiments; and, indeed, Professor Ewart suggests it may have been such a factor in evolution as Romanes

(1) "The Penycuik Experiments," by J. C. Ewart, M.D., F.R.S., Regius Professor of Natural History, University of Edinburgh. 6 in. × 9 in., xciii. + 177 pp., 46 figures. (London: Adam and Charles Black, 1899). 10s.

believed sterility to have been. Speaking generally, characters developed recently in the history of species, are not reproduced in the bodies of hybrids between them. For instance, none of the zebra hybrids inherited the light ground colour of the zebra (p. lxvi.) sire. Again, the same thing

Head of Burchell's Zebra (Male).

happens with cross breeding, which differs from the other only in degree and not in kind. On the other hand, animals which are inbred are found to be prepotent, even in recently attained features, and prepotency accompanies spots.

In conclusion we might touch upon the question of the ancestry and coloration of the horse tribe, of which Professor Ewart speaks in several places. Briefly, *Hipparion* of the Old and New worlds is put down as the ancestor of the zebras and asses; while our modern horse is traced to *Protohippus* of America (p. 113).

The donkey type is considered to have early separated from the zebras, whose coloration (pl. xvi.) has become very specialized (except in the extinct *Equus quagga*) by the darkening of stripes and lightening of the ground colour. The stripes (p. 123) still farther back arose from the coalescence of spots, such as takes place during the first year or so in zebra-horse hybrids. A reversion to a spotted condition may also be seen in zebra-ass hybrids. Professor Ewart distinctly separates dappling in horses (p. 123), which is a variation under domestication and may co-exist with stripes, from the primaeval spots.

It is distinctly stated that the stripes have no relation to the ribs or to the course of nerves or blood vessels in recent zebras; but Professor Ewart says they may have followed the latter in their ancestors. This is not much support for Tylor's theory, which seems to be rather a weak one.

Of the types of coloration in zebras, much has been discovered by the experimenter. No two species or individuals are exactly striped alike; nor is one side of an animal identical in pattern with the other. Three types are distinguished, but not necessarily readily, as Professor Ewart thought at first, by markings (p. x.) They are—

Head of Hybrid, Zebra Male—Horse Female.

(1) Grevy's zebra (*E. grevyi*), of Shoa and Somaliland: probably the one known at Rome in the third century.

(2) Mountain zebra (*E. zebra*), once abundant in South Africa, and hence called the common zebra,

(3) Burchell's zebra (*E. burchelli*); this includes several species or sub-species.

There is no link missing in the chain of

markings between the mountain zebra, with the "gridiron" over the hind-quarters, and legs barred to the hoofs, and the true Burchell zebras, with perfectly white legs and scarcely a vestige of transverse stripes. The Somaliland type is the most primitive, and it is with this that the hybrids most closely agree in their markings.

To what has already been said about the ancestry of the horse, it may be added that the stripes recorded approach also to the Somaliland zebra type, as may be seen by comparing fig. 36 of the heads of a Norwegian pony with that of the zebra in question, seen in figs. 34 and 35. That the ancient horse had an upright mane like a zebra is shown by the drawings left us by palaeolithic man, and, with regard to its ground colouring, Professor Ewart (p. 116) is "inclined to believe that the body colour of the striped ancestral horse of the temperate regions was mainly of a yellowish-brown colour. As the descendants extended their range the ground colour would change, a sand colour probably prevailing in desert areas, a reddish-dun in the vicinity of forests, a mouse-dun in the far north, a light tint near the tropics, and in the uplands a grey or ash tint."

2, *The Broadway, Hammersmith.*

THE METRIC SYSTEM.

By James Quick.

IN 1895 the question of the general introduction of the metric system of weights and measures was prominent in many minds. The Report of the Select Parliamentary Committee appointed to investigate the question was sent in during July of that year. This report teemed with reasons for the adoption of the system; much evidence having been brought forward in the affirmative, and practically none in the negative. In November 1895, an influential deputation, representing forty-six chambers of commerce in the United Kingdom, waited upon Mr. Balfour to urge the change from Imperial units to metric ones.

Over three years have now passed since the Government was thus approached, and beyond the passing of a permissive Bill, not much has been done officially, towards legalising the use of the decimal system, or making it compulsory in England. It must, however, be only a matter of short time before such an advantageous and far-reaching system is accepted in England.

Happily for Science, the scientific world has for long practically discarded the confusing English system for the metric, whether its calculations are simple or intricate. No one will deny that by so doing scientific men throughout the world have been drawn more into touch with one another, and that the bond of friendship between them has been strengthened. No matter of what nationality a man may be, whether English, French, German, or Italian, if he is educated in Science he will at once grasp the scale of an illustration, a curve or a drawing. He will immediately understand the magnitude of a result of his foreign co-worker, if such terms as centimetres, litres, ergs, or kilogrammes-metres are used.

I have said that the scientific world has practically adopted the metric system. Engineers, however, still treasure the foot and the pound, and keep the foot-pound of work as a precious thing. A foot is a foot, a pound is a pound, and a foot-pound of work is a very simple expression they say. More than one Continental estimate for plant and machinery has, however, been lost to our engineers for the reason that the machines would not be designed to metric dimensions and the cost was not calculated in the country's coinage.

Considering the importance of the subject, it will be useful to discuss the various units and terms of the metric system, and to point out their relations to those of the English system. The great beauty of the former is, of course, the facility with which one can change from one magnitude to another, by simply transferring the decimal point. Take an example, before going further. To reduce, say 5039·5 millimetres to metres only requires a glance to write 5·0395 metres, as there are a thousand millimetres to a metre. Now, even though the reduction from feet to yards is one of the simplest operations upon the Imperial system, yet the division of the above number by three will not be done so quickly as the reduction of millimetres to metres, The uniformity of the system will also be clearly seen from the following tables.

Lengths.

The unit of length is the *metre*, and was originally calculated to be the exact ten-millionth part of a quadrant of the earth, from pole to equator. This standard length is preserved in the French Archives in the form of a platinum rod at a temperature of melting ice. The metre is about three inches over a yard in length, as will be seen from the following table, and it is split up into tenths and hundredths for convenience in small measurements. Multiples of it are also taken for the other extreme. We notice here, as in all the other tables, that a unit is never split up, nor multiples taken in anything but tens, hundreds, or thousands, thus keeping rigidly to decimal manipulations:

Table of Lengths.

10 millimetres	(mm)	= 1 centimetre	(cm) =	·3937 inch	1 in. =	2·54 cm.
10 centimetres	(cm)	= 1 decimetre	(dcm) =	3·9370 „	1 in. =	·254 dcm.
10 decimetres	(dcm)	= 1 metre	(m) =	39·3708 „	=	1·0936 yards.
10 metres	(m)	= 1 dekametre	(dkm) =	10·936 yards.		
10 dekametres	(dkm)	= 1 hektometre	(hkm) =	109·363 yards.		
10 hektometres	(hkm)	= 1 kilometre	(km) =	1,000 metres.		

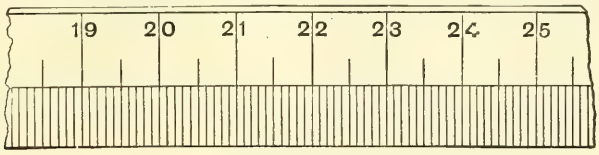


Fig 1.

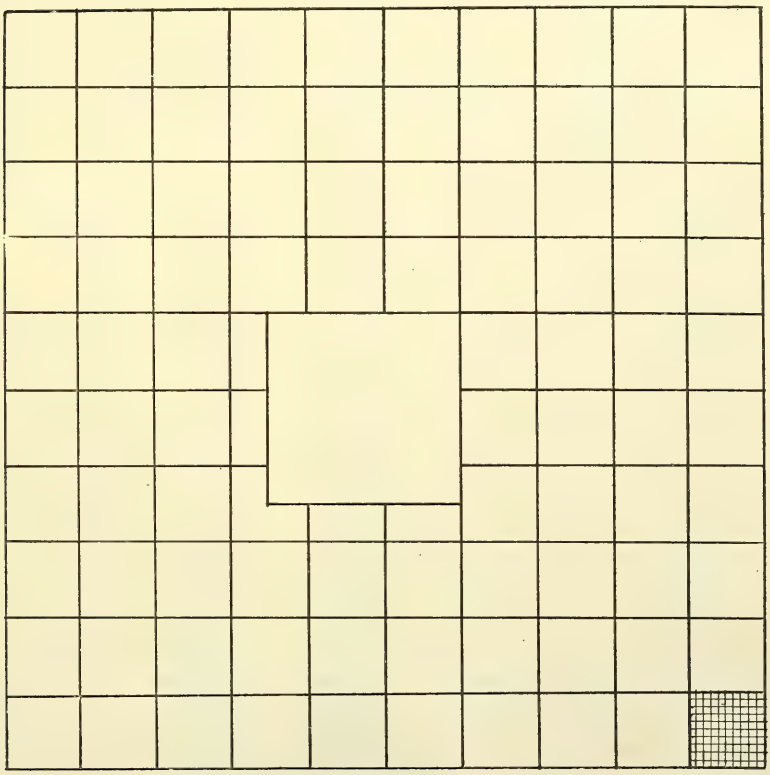


Fig. 2.

The usual contractions for the above measures are given in brackets.

Comparison between some of these lengths will be easily made from fig. 2. Fig. 1 shows the actual sizes of centimetres and millimetres.

Areas.

Coming now to the second dimension, the unit on the square measure will of course be the *square metre*; and as again this particular size is not convenient for all purposes, it has been treated in the same way as the metre. The same distinctive names are applied to the multiples and submultiples of the square metre as to those of the first dimension unit. They will here, of course be hundredth parts, not tenths.

Table of Areas.

100 sq. mms.	= 1 sq. cm.	=	·155 sq. inch.
100 sq. cms.	= 1 sq. dcm.	=	15·500 sq. inch.
100 sq. dcms.	= 1 sq. metre	=	1550·058 sq. inch.
100 sq. metres	= 1 sq. dkm.	=	119·60 sq. yards
100 sq. dkms.	= 1 sq. hkm.	=	11960·33 sq. yards
100 sq. hkms.	= 1 sq. km.	=	247 acres.
1 sq. inch	= 6·4514 sq. cms.		
1 sq. foot	= 9·2899 sq. dcms.		
1 sq. yard	= 0·8361 sq. metre		

Comparison between some of these areas can be made from fig. 2, which shows the actual size of a square decimetre, divided into its 100 square centimetres, one of which is also split up into its 100 square millimetres. In the centre is a square

inch, each side of which will be seen to be equal to just over 2½ centimetres (2·54).

Volumes.

In the third dimensional measures, or measures of volume and solidity, it might be expected that the cube of the linear unit, the cubic metre, would be the one chosen. This unit is, however, too large for ordinary manipulations, although it is sometimes used for scientific purposes. The unit taken is the *cubic decimetre* and is called a *litre*. A cubic centimetre is therefore a thousandth part of a litre and a litre a thousandth part of a cubic metre, as will be seen from the following table:—

Table of Volumes.

10 millilitres or 10 cubic centimetres	= 1 centilitre	(cl)	= ·610 cubic inch.
10 centilitres (cl)	= 1 decilitre	(dcl)	= 6·102 cubic inches.
10 decilitres (dcl)	= 1 litre	(l)	= 61·027 cubic inches.
10 litres (l)	= 1 dekalitre	(dkl)	= ·353 cubic foot.
10 dekalitres (dkl)	= 1 hektolitre	(hkl)	= 3·532 cubic feet.
10 hektolitres (hkl)	= 1 kilolitre	(kilo)	= 35·316 cubic feet.

1 cubic inch = 16·386 cc. 1 cubic foot = 28·315 litres.

1 gallon = 4·543 litres.

Various vessels, such as burettes, flasks, pipettes, &c., are used for measuring volumes, and some of these are shown in fig. 3. Flasks and some pipettes for measuring off some one definite volume are provided with an engraved ring round the neck, thus marking off the exact quantity, viz.:—1 litre, 1 centilitre or 1 cubic centimetre, as the case may be.

Other pipettes and most burettes are divided throughout their length into cubic centimetres or fractions of cubic centimetres, some measuring as accurately as to $\frac{1}{50}$th of a cubic centimetre.

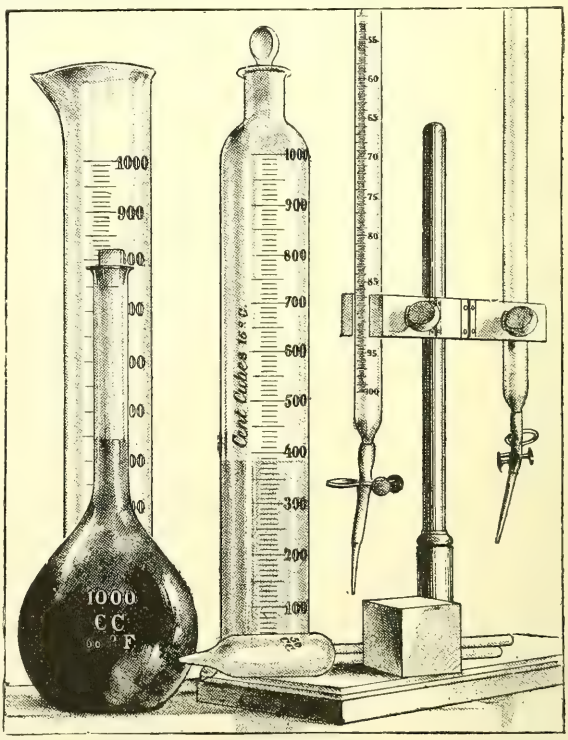


Fig. 3.

Weights.

Coming now to the question of weights we find there is an intimate connection between these and the measures last discussed. As a matter of fact, the scale of weights on the metric system has been compiled directly from consideration of volumes. The unit of weight is the *gramme* and it is the weight of one cubic centimetre of water when at the temperature of 4° Centigrade.(1)

The gramme being too small for some purposes, the kilogramme is frequently used as the unit. The relation between these and other multiples will be seen from the table:

Table of Weights.

10 milligrammes (mgm)	= 1 centigramme	(cgm)	= ·1543 grains.
10 centigrammes	= 1 decigramme	(dcgm)	= 1·543 grains.
10 decigrammes	= 1 gramme	(gm)	= 15·432 grains.
10 grammes	= 1 dekagramme	(dkgm)	= ·022 lb. avd.
10 dekagrammes	= 1 hektogramme	(hkgm)	= ·2204 lb. avd.
10 hektogrammes	= 1 kilogramme	(klgm)	= 2·204 lb. avd.

1 grain = ·0648 grammes. 1 oz. troy = 31·103 grammes. 1 oz. avd. = 28·35 grammes.

1 lb. avd. = 453·59 grammes. 1 cwt. = 50·8 kilogrammes.

Time.

In the above tables we have given two out of the three fundamental units that are necessary in all scientific questions. These are the centimetre and the gramme, to designate units of length and mass. The third absolute quantity that requires a unit is, of course, time, and the unit for this is the same on both systems, viz.: the second. These three fundamental units therefore constitute what is called the Centimetre-Gramme-Second system, or shortly the C. G. S. system. All other quantities, such as force, work, energy, &c., are

(1) Accurately speaking, this definition should include the latitude in which this weight is taken, for it must be remembered that although the mass of a body is constant everywhere, its weight—or the force of attraction between it and the earth—varies with the latitude, being greatest at the poles and least at the equator.

derived from these fundamentals and are called derivative units.

From what has now been said, it will be seen that calculations based upon metric dimensions and measures are more readily performed than with our English units. There are no troublesome $5\frac{1}{2}$ and $30\frac{1}{4}$ measures to contend with. The units of the various tables are moreover connected with the unit of length by a simple relation.

Force and Work.

It will, perhaps, be interesting to glance at two other quantities on the metric system—derivative units, and to compare them with those obtained upon our system. These are force and work, and they are tabulated as follows:—

Quantity.	Unit on Metric System.	Unit on English System.	Definition on Metric System.	Definition on English System.
Force.	Dyne.	Poundal.	The force that, acting upon a mass of 1 gramme for 1 second, gives it a velocity of 1 cm. per second.	The force, that acting upon a mass of 1 pound for 1 second, gives it a velocity of 1 foot per second.
Work.	Erg.	Foot-Poundal.	The work done by one dyne in acting through 1 cm.	The work done by 1 poundal acting through 1 foot.
	Gramme-centimetre.	Foot-Pound.	The work done in raising one gramme through 1 cm.	The work done in raising 1 pound through 1 foot.

It will be seen that two units of work are given in each system. The gramme-centimetre and the foot-pound are the units more generally used in engineering and are calculated upon the weight of a body and not upon its mass. The gramme-centimetre is, as a matter of fact, found too small for practical purposes and the kilogramme-metre is used instead. A kilogramme-metre is the work done in raising one kilogramme through a height of one metre.

Use of Metric System.

From a consideration of the foregoing tables and definitions and of the simplicity of the metric system, it is not surprising that other nations have adopted it. Between twenty and thirty countries have taken it up either as a compulsory measure or as a permissive one. The numerous reports that have been sent in by different consuls from various parts of the world point out how much our foreign trade is suffering through our not using the decimal system. In those countries where it is in force, intending purchasers fail to understand quotations based upon our present weights, measures and coinage.

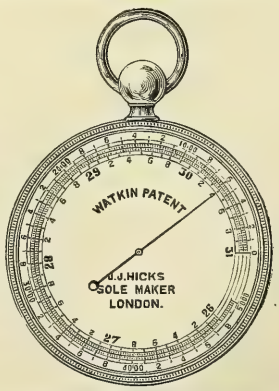
The change will certainly be a momentous one for English people and there must be confusion just at first. Lord Kelvin, however, believes that the difficulty of making the change has been enormously exaggerated. He thinks that in a fortnight people would become so much accustomed to the perfect simplicity and easy working under the metric system that they would feel that, instead of its being a labour to pass from the one system to the other, it would be less than no labour. That is to say, it would be a very great saving of labour after the first day or two of beginning to use the new system.

The Decimal Association is doing good work in helping on the change. Its influence is increasing and its list of supporters include the names of some of the foremost men in science, politics and commerce. The President of the Board of Trade received a deputation of representatives from the Decimal Association, and other bodies, on March 22nd supporting the compulsory use of the system in this country.

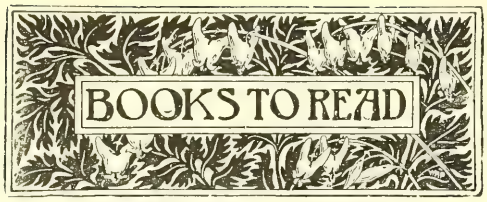
Suffolk House, Dartmouth Park Hill, London, N.W.

WATKIN'S MOUNTAIN ANEROID.

IN our notice of this beautiful instrument in last month's issue of Science-Gossip (p. 294), an unfortunate printer's mistake crept into the account of the fractional deviation or error. This was made to represent $\frac{1}{100000}$, whereas it should have been equivalent to a loss of 0·00225 or $\frac{225}{100000}$ of an inch. This latter fraction is remarkable, and doubtless most of our readers must have noticed the improbability of the former statement.



We have now pleasure in giving a figure of Colonel Watkin's aneroid barometer.



NOTICES BY JOHN T. CARRINGTON.

The Last Link. By ERNST HAECKEL; with Notes and Biographical Sketches by HANS GADOW, F.R.S. 160 pp. 7½ in. × 5 in., and diagrams. (London: Adam and Charles Black, 1898.) 2s. 6d.

This little book is an elaboration of the author's address before the Fourth International Congress of Zoology, at Cambridge, on "Our Present Knowledge of the Descent of Man," delivered on August 26th, 1898. In this he has sought to show that remains discovered by Dr. Eugène Dubois of an ape-like man named *Pithecanthropus erectus*, are indeed the missing, or last link, in the chain of evolution of man from the anthropoid apes. These much-debated remains have on several occasions been referred to in SCIENCE-GOSSIP as those found by Dr. Dubois in 1894 in Java. Professor Haeckel by no means stands alone in this belief, though he has many opponents. The object of the publication is to affirm his position in the controversy. In this he is supported by his late pupil and present friend, Dr. Gadow, of Cambridge. The latter author has added many important notes and biographical sketches of some of the most important labourers in this field of investigation, such as Lamarck, Geoffrey Saint-Hilaire, Cuvier, von Baer, Virchow, Edward D. Cope, Haeckel himself, and others. There are chapters on the Theory of Cells, Factors of Evolution, also on Geological Time and Evolution. This book contains enough information to satisfy not only ordinary readers, or more advanced students, but most thinking persons who may find satisfaction in knowing that Professor Haeckel states in conclusion: "The direct descent of man from some extinct ape-like form is now without doubt, and admits of being traced much more clearly than the origin of many another mammalian order."

Chemistry for Photographers. By CHARLES F. TOWNSEND, F.C.S., F.R.P.S., 158 pp. 7¼ by 5, illustrated. (London: Dawbarn and Ward Limited, 1899), 1s.

This is a useful book for the amateur photographer who has not studied chemistry. Even those who have done so may get hints from its pages that are not to be despised. The book is divided into fifteen chapters, including an introduction. Among them are articles on developing, reversal, reduction, printing in various media, etc.

The Science of Life. By J. ARTHUR THOMPSON, M.A. x. + 243 pp. 7½ in. × 5 in. (London, Glasgow, and Dublin: Blackie & Son, Ltd., 1899.) 2s. 6d.

This book is one of the publishers' Victorian Era Series, and will be found to contain a history of the rise of the science now named Biology. In it, the author, who is connected with the Zoological Laboratory of the School of Medicine of the Royal College, Edinburgh, traces the history of biology from the earliest times, but naturally gives most attention to the remarkable strides made during the Queen's reign. The book is divided into about fifteen chapters, which teem with interesting facts for even others than mere casual readers.

Early Chapters in Science. By MRS. W. AWDRY. Edited by W. F. BARRETT. xviii. + 348 pp. 8 in. × 5 in., with 180 illustrations. (London: John Murray, 1899.) 6s.

We have not for a long time met with a more pleasantly written or prettily produced book than the one before us. The author, who is the wife of Bishop Awdry, of Japan, describes her work as "A First Book of Knowledge of Natural History, Botany, Physiology, Physics, and Chemistry for Young People," It thus forms an introduction to the divisions of Biological and Experimental Science. It is divided into two parts: the first entitled 'The World of Life,' the second 'The World of Experiment.' Thus the reader is, in the earlier chapters, taught to observe, and later to question, Nature. It cannot be complained that the range of the book is too narrow, for it extends to the whole breadth of natural and physical science. Professor Barrett, of the Royal College of Science for Ireland, has ably edited the pages, and has had the assistance of many recognized naturalists and others in his work. These include Mr. G. H. Carpenter, B.Sc., Naturalist to the Science and Art Museum, Dublin; Dr. T. Johnson, F.L.S., Professor of Botany in the Royal College of Science, Dublin; Professor J. A. Scott, Mr. H. Ramage, the Rev. Maxwell H. Close, and others. The really delightful drawings are chiefly by Miss L. Stevenson and Miss J. Mothersole. We can strongly recommend this work as just what is required for young people.

Birds. By A. H. EVANS, M.A. xvi. + 635 pp. 6¼ in. × 9 in., 144 illustrations and coloured charts of the North and South Polar Regions. (London and New York: Macmillan & Co., Ltd., 1899.) 17s.

This forms vol. ix. of "The Cambridge Natural History"; and it is produced in a manner uniform with the other books of this handsome series. The work is prefaced by a scheme of classification founded on an arrangement from the lowest forms and the Ratite birds upwards. The Carinate birds are divided, after Dr. Gadow's plan, into two Brigades or main sections, and these into Legions, Orders, and so forth. The book does not pretend to go into more than a plain statement of the subject, which is beautifully illustrated by the 144 figures, many being by that excellent artist, Mr. G. E. Lodge, whose drawing of the Great Auk we reproduce by permission of the publishers. All the complex and controversial points of Ornithology are avoided, such as Variation, Hybridization, Myology, Mechanism of Flight, Lines of Flight on Migration, &c., the author referring his readers to Professor Newton's admirable "Dictionary of Birds." Still, many of these subjects are dealt with in the introduction, but merely as statements of fact. General readers will find this work most useful in obtaining a proper understanding of birds, and will be assisted by the effective diagram of a hawk in the introduction, showing the recognised names of every part of the exterior appearance. The expressions used in naming the various portions are fully explained on the adjoining page. As we have already said, the illustrations are admirable. The book is a useful addition to any library, as it treats of nearly every known kind of bird throughout the world.

Animals of To-day: Their Life and Conversation. By C. J. Cornish. x. + 319 pp. 8 in. by 5½ in., with 16 illustrations. (London: Seeley & Co., Ltd., 1898.) 6s.

This is a pleasing series of amusingly-written essays upon domestic and other animals, which originally appeared in the "Spectator," but have been collected by the author in book form and charmingly illustrated by the reproduction of a number of beautiful photographs by Mr. Charles Reid. In fact the book has been altogether well produced by the publishers. The casual reader, rather than the science student, will find pleasure in Mr. Cornish's "Animals of To-day"; though the latter should take it as a course of lighter literature which will not fail to suggest some problems for scientific investigation.

River Development. By Professor I. C. Russell. pp. xix. + 327, 8½ in. × 6 in. and 23 illus. (London: J. Murray; New York: G. P. Putnam's Sons, 1898.) 6s.

This work is included in Mr. Murray's "Progressive Science Series," and deals more particularly with the rivers of North America, although we notice an illustration of "pot-hole" action in the basalt of Antrim. The progressive development of rivers is exhaustively treated, and will prove of great interest to British geologists desiring a grasp of the subject beyond our own islands. The gigantic scale in which river action goes on in the great continent of America, although the same in kind as that with which we are familiar in Britain, varies so thoroughly in degree, that the perusal of this book is like entering a fresh world. America, too, is likely in the future to have in store more surprises, both physical and palaeontological, and an opportunity here presents itself for home geologists to prepare their minds for further discoveries. The disintegration of rocks is dealt with early, and this, of course, is of interest over all the geological world. We read of the laws governing streams, the influence of hardness in producing scenery, analyses of various American river waters, alluvial deposits, the growth of deltas, glacial or other terraces, and the special characters of the principal American rivers. Finally, by way of summary, there is a "Life History of a River," which, in twenty pages, gives a good and very readable account of the various actions which are brought to bear on the river as it pursues development from its inception to the present day. Many of the illustrations are selected with much taste, and form excellent examples of the influence of rivers in the formation of scenery.—E.A.M.

The Great Auk.
From "Birds," by A. H. Evans, M.A.

Physical Geography. By Professor William Morris Davis, assisted by W. H. Snyder. pp. 428, 7½ in. × 5 in., illustrated. (Boston and London: Ginn and Co., 1898.)

Professor Davis, of Harvard University, is to be congratulated on a brilliant exposition of the whole subject of physical geography as distinguished from physiography. Organic forms are but sparingly touched upon, and then only to illustrate the physical action. The illustrations are many, and exceedingly appropriate. The diagrammatic illustrations of river-growth are of a striking character; many are drawn from American sources, but the wide world is requisitioned for instances suitable to the subject to be demonstrated. At the end of the book is a series of nine reference maps, sufficiently detailed for the purposes of illustration. We can say that this is the best work of the kind we have yet seen.—E. A. M.

An important bibliography of contributions to American Economic Entomology compiled by Mr. Nathan Banks, is issued by the Division of Entomology in the United States Department of Agriculture, Washington. About four thousand titles are included.

Herr Hauer, who was formally Director of the National Geological Museum and Superintendent of the Royal Natural History Museum, died in Berlin on the 21st of March. He was a Privy Councillor and a well-known naturalist.

To meet the convenience of the local Society, we understand the Annual Congress of the South-Eastern Union of Scientific Societies will be held at Rochester on the 25th, 26th, and 27th of May, instead of on dates previously arranged. The Honorary General Secretary is Mr. G. Abbott, of 33, Upper Grosvenor Road, Tunbridge Wells.

Mrs. M. P. Fleming has been appointed curator of astronomical photographs in the Harvard University. Her name is the first woman's to be placed with other officers in the University catalogue. A list of women astronomers, however, compiled by Herman S. Davies, contains as contemporary workers in that science, the names of seventeen American women who have taken part in astronomical research.

To find a recent skull of an elephant on an English shore is not the lot of most naturalists, No doubt Mr. D. Murray, of Kilsea, near Spurn, in Yorkshire, was not a little astonished at finding such an object on his coast line. As he suggests, it was probably owned by a captive elephant that died at sea, and was thrown overboard. The object was exhibited, with several good fossils from the same beach, at a recent sectional meeting of the Hull Scientific and Field Naturalists' Club.

The Moss Exchange Club, of which the Rev. C. H. Waddell, Saintfield, Co. Down, is the Honorary Secretary, has just issued its report for the years 1896-7-8. Considering the restricted number of students of this section of cryptogamic botany, the club seems to be in a flourishing and progressive condition. It was established in 1896 with thirteen members, and now has three-fold that number. There are some notes on mosses, and a list of species that do not fruit in these islands.

Professor McIntosh has prepared a work for the Cambridge University Press, founded on his many years' experience in the Scotch Department of Fisheries. It is entitled the "Resources of the Sea," or "An Enquiry into the Experiments on Trawling and Closure of Areas." Our view, frequently expressed in this journal, that man very rarely directly causes the extinction of any wild animals, is fully supported by Professor McIntosh, with regard to marine food-fish.

We are sometimes asked to recommend a handy little first book on Science to give to intelligent children. We cannot do better than suggest as a primer the English edition of M. Paul Bert's "First Year of Scientific Knowledge."

The "Practical Electrician's Pocket Book and Diary" for 1899, an entirely new work, has been issued from the office of "Electricity," 11, Ludgate Hill, London. It contains much useful information; but in the next edition it would be an improvement if another quality of paper were used. The published price is one shilling.

By the death of Sir Douglas Galton, on March 10th, at the age of seventy-seven years, Science has lost one of her hardest workers. His chief labour was in sanitary science, and much of the high sanitary condition of the Metropolis is due to his exertions and influence. He was elected an F.R.S. so long ago as 1863.

Science has been honoured in Liverpool by a banquet given on March 4th by the Lord Mayor of Liverpool to Professor Oliver Lodge in recognition of his having received the Rumford Medal of the Royal Society for important discoveries in Light and Heat. The dinner was attended by Sir William Crookes and other eminent investigators.

Dr. Charles Drury Edward Fortnum, a trustee of the British Museum and a mineralogist of renown, died on the 13th March. He was an explorer for minerals in South Australia in the forties, and presented a valuable collection of Natural Science objects to the Oxford University.

An interesting paper was read by Mr. F. J. Brodie, before the Royal Meteorological Society, on the 15th of March. It dealt with "The Prolonged Deficiency of Rain in 1897 and 1898." It appears that London and South Eastern England generally, has during the last two years passed through its dryest period since 1841, the rainfall of the district varying from 51 per cent. to 80 per cent. below the average. During the same period Ireland and N.W. Scotland have had more than their usual rainfall.

The report for the two years ending September 1898, of the Bristol Museum and Reference Library feelingly refers to their former curator, the late Edward Wilson, F.G.S., whose death was referred to in these pages at the time of its occurrence. The museum has benefited by the presentation, by his sister and brother, of Mr. Wilson's private collections. Mr. G. C. Griffiths, F.E.S., has rearranged the museum collection of British Lepidoptera and added to its usefulness by presenting a large number of specimens from his own collection. Much vigour is indicated by this report under the auspices of Mr. Herbert Bolton, F.R.S.E., the present curator and secretary.

Astronomers of this country have again had their ranks thinned by the death, on 5th of March, of Miss Elizabeth Brown, of Further Barton, Chichester. This lady had attained considerable reputation as one of the most successful of British amateur astronomers. Her special work was on sunspots which she observed and drew with much accuracy, being director of that department of the British Astronomical Society, a post she had also filled in the Liverpool Astronomical Society. Miss Brown travelled in 1887 to Moscow, in 1889 to Trinidad, and in 1896 to Vadso in Lapland, in each instance to observe a total eclipse of the sun.

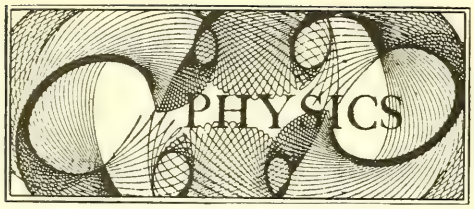
MICROSCOPY

Flotation of Foraminifera.—The following details from my note-book on the subject of Mediterranean sponge-sand will perhaps interest your readers, and may help to explain the failure (*ante*, p. 286) to make successful floatings from such small quantities as from one quarter of an ounce to one ounce of material used by Dr. Bryan. My figures will probably hold good for any average sample of the fine or common sponge-sand, such as may be readily procured from a chemist or sponge merchant. There is also a coarser Mediterranean sponge-sand, evidently from extremely shallow water; but this is of infrequent occurrence, and difficult to obtain. My object was to ascertain roughly to what extent foraminifera contributed to the formation of this deposit, which must cover large areas on the shallow southern coasts of the Mediterranean. For this purpose I passed a quantity of the sand, weighing in all 2,300 grains, through a succession of sieves, with the following results: (*a*) Passed through sieve No. 17 silk gauze of 160 meshes to linear inch (879 grains). This formed an impalpable sand, composed of fine siliceous and calcareous particles, averaging about one three-hundredth inch in diameter. It contained no recognizable remains of foraminifera, except a few primordial chambers, although the calcareous portion—about one-third of the whole—was doubtless due to their disintegration. (*b*) Passed through sieve of copper wire gauze, 120 meshes to linear inch (753 grains).—A similar but coarser sand, averaging one two-hundredth inch in diameter. Foraminifera were numerous, but always fragmentary or immature. (*c*) Passed through sieve of brass wire gauze, 80 meshes to linear inch (340 grains).—A fine siliceous sand, with an admixture of about 20 per cent. calcareous matter, chiefly foraminiferous. Specimens, mostly immature and broken, but including perfect specimens of the smaller genera, *Bolivina, Discorbina, Nonionina*, &c. (*d*) Passed through sieve of brass wire gauze, 40 meshes to linear inch (290 grains).—Similar to the last, but coarser. The foraminifera chiefly small specimens of *Peneroplis, Polystomella, Miliolina*, and similar shallow-water forms; a large percentage of them broken, and, with the exception of the Miliolidae, all poor floating forms. (*e*) Retained in sieve of 40 meshes to linear inch (23 grains).—Almost entirely calcareous, and principally composed of foraminifera, many broken and more or less worn. *Peneroplis, Miliolina, Spiroloculina*, and *Polystomella* were the predominant forms. Loss in sifting, 15 grains. Total, 2,300 grains. Now, there are two facts worth noting in connection with these figures: first, the large proportion of 1,632 out of 2,300 grains entirely destitute of foraminifera, a further 340 grains containing but very few specimens; second, the entire absence of the Lagenidae and Globigerinidae, which, of all foraminifera, are the readiest to float. I may say that I have never tried to make floatings from sponge sand, and should think it about as difficult a material to work with as it would be possible to obtain. At the same time, I have no doubt that with patience and a sufficient amount of technical skill, such a thing would be possible; although, for the reasons I have already mentioned, the percentage of floats obtained would be very small. Dr. Bryan should have removed the finer portion (*a* and *b*) by means of sifting, as these minute particles, being practically of no weight, are more subject to capillarity than the forams. It is possible to prepare floatings from even a quarter ounce of material, but, unless for special reasons, I should not attempt it, as the amount of time and trouble spent on the work would be more than sufficient to examine and pick over the material under a microscope. The method I employ in such cases is to place the material in a tiny beaker or evaporating dish, removing the floats with ungummed cigarette papers, to which the forams adhere when they are rested on the surface of the water. I then dry the papers, and brush the floatings off into a tube with a dry sable brush. If a large quantity of sand is poured into water at one time, there would, of course, be considerable risk of the floatings being carried down with the sand and covered; hence I generally add the sand a spoonful at a time, removing the forams continually as they rise. I am afraid a description of my methods and apparatus would take up too much space, but if the Editor thinks it would be of interest to the readers, I will describe them with pleasure in a future paper.—A. Earland, 28, *Glenwood Road, Catford, S.E.*

Parasite of Humble Bees.—Whilst cycling in Wiltshire last autumn, at the close of a very hot day, I noticed a strange looking creature crawling across the road, apparently helpless. On closer examination I found it to be a humble bee, *Psithyrus rupestris*. It was completely covered with hundreds of parasites, which accounted for its curious light brown appearance. Under the microscope the parasite was seen to be one of the

mites *Gamasus coleoptratorum*. They are by no means uncommon and are well known to infest both the humble bee and dung beetle. I have found them on the last named insect as recently as January of this year. A very full description of this and allied species will be found in the Linnaean Society's Transactions. The accompanying photo-micrograph is taken from a specimen mounted in Canada balsam.—F. Noad Clarke, *Paddington Infirmary, London.*

Journal of Applied Microscopy.—With the beginning of this year Volume II. of the "Journal of Applied Microscopy" commenced. It is a monthly magazine published by the Bausch and Lomb Optical Company, Rochester, New York.



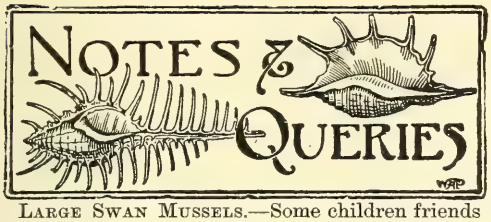
CONDUCTED BY JAMES QUICK.

PRODUCTION OF HIGH VACUA BY LIQUID HYDROGEN.—Professor Dewar's investigations upon liquid hydrogen and the application of it are opening up a wide field both to physicists and chemists. Not the least interesting part of the work is the rapidity with which by its means high vacua can be produced in vessels. As a matter of fact the vacua obtained are so perfect that it is inferred both theoretically and experimentally that the vacuum left after liquefying the air out of a vessel by means of liquid hydrogen cannot exceed the millionth part of the atmospheric pressure, excluding the pressure from any incondensible material other than nitrogen and oxygen. Two vacuum tubes were taken and arranged so that their drawn-out open ends could be inserted in liquid hydrogen and the air contained in them solidified. They were then sealed off. On attempting to pass an electric spark through them their excellent exhaustion was revealed by great resistance to the passage of the discharge. Similar tubes specially freed from gases and impurities on the glass, had to be heated before discharge would take place at all. The rapidity with which the exhaustion in these tubes takes place is very great, only a few seconds required to make it complete. If it becomes possible to perform this kind of work on a larger scale, and in a less expensive manner, the extensive manufacture of vacuum tubes for Röntgen Ray and other work will be very materially simplified and shortened.

THE NERNST ELECTRIC LIGHT.—In a paper before the Society of Arts on February 8th last Mr. J. Swinburne gave a detailed description of the electric lamp lighting, recently invented by Professor Nernst, of Göttingen. The present system of incandescent electric lighting is the heating of a thin carbon filament of different thicknesses and shapes to conform to the various requirements of pressure, candle-power, &c. The question of incandescent lamps is one that has not received the attention it merits. Since this form of lighting began to be extensively used, not much has been done to radically improve the efficiency. Incandescent lamps of the present day still require from 2½ to 4 watts per candle-power for satisfactory lighting. Nernst rejects carbon altogether in his form, and uses highly refractory oxides as his material, as is done in the Welsbach lights. The substance is an insulator at ordinary temperatures; but becomes an electrolyte at high temperatures. Upon this fact the working of the light depends. The oxides are made up in the form of thin rods, having two platinum wires connected to the ends. As the material is at first an insulator, it requires to be heated to a comparatively small extent by some external means before the current can pass and raise it to white incandescence. The arrangement takes the form of a heating resistance—close to the rod and in connection with it. This circuit is broken again as soon as the rod is heated sufficiently to conduct, when the main current then raises the temperature of the rod, and therefore the light emitted, to far beyond that attained with the ordinary carbon filament. The efficiency is remarkable, the average consumption being 1·5 watts per candle power. If no serious difficulties occur in the commercial working of this principle, the importance of it to the electric lighting industry cannot be overrated.

FAWCETT'S PATENT STANDARD HIGH RESISTANCES.—The two forms of high resistances in use at present are those made with insulated wire and those with carbon lines upon an insulating base. The first of these is costly, the second unreliable. Mr. F. B. Fawcett has done a considerable amount of work upon this subject and has now brought forward an improved method for the making of these resistances, and one which has satisfactorily stood severe tests. The resistance films are metallic and are produced upon glass by the electrical discharge of the metal particles from a cathode composed of a grid of platinum and gold; the whole arranged in a vacuum. When the film is first deposited, its resistance alters at a rapidly increasing rate; the alteration continuing for many months. This is probably due to dissolved gas and molecular rearrangement in the film. The resistance becomes perfectly constant, however, if the film is boiled for several hours under diminished pressure in a suitable oil. Experiments were made by Mr. Fawcett to arrive at the effect, upon the temperature co-efficient, of varying the thickness of film used. Starting with a film the thickness of which we may, comparatively, call 1, the alteration in resistance per degree C. rise in temperature was ·0028; with a film of thickness 99 the value was ·0153, thus showing the great advantage of thin films. By diminishing the thickness still further the temperature co-efficient has been decreased to ·0004 per cent., which is practically *nil*. The exact resistance of any film is obtained by a process of scratching with a needle when the film has been hardened by its immersion into the oil bath. Further advantages of these resistances, besides those given above, are their negligeable capacity and self-induction.

MEASURING EXTREME TEMPERATURES.—This subject formed the discourse by Professor Callendar at the Friday evening meeting of the Royal Institution on March 10th. The measurement of high temperatures has been and is an absorbing subject with Professor Callendar, to which the number of instruments specially designed by him, both on the lecture table and exhibited in the library, bore striking evidence. The difficulties in the way of deducing high temperatures not obtainable by direct experiment, were pointed out. "Extrapolation" as a means of obtaining these temperatures has led to confusing results and curves, due to insufficient data; and Professor Callender remarked that the only way out of the difficulty was to extend the range of actual observation and measurement. Many experiments were shown to illustrate the different points, amongst them being an arrangement for showing, with gases, the principle of the Wheatstone bridge. Illustrating this principle by the flow of water is not new, but it is interesting to see an extension of the application.



Large Swan Mussels.—Some children friends found last autumn shells of the Swan-Mussel (*Anodonta cygnea*) in the lake at Englefield, in Berkshire, which was almost dry at the time. These shells have been sent to me, and prove to be exceptionally large. The greater of them is nearly nine inches long, and more than ten and a half inches at the extreme girth of the shell. Can any reader tell us anything about the approximate age of the animals bearing these shells? —Mrs. Emily J. Climenson, *Henley-on-Thames.*

The Singing-Fly.—Some months since there appeared in a local journal a notice respecting certain insects presented to the Natural History Museum, South Kensington, by our townsman, Mr. C. J. Watkins. In this notice special mention was made of the dipterous fly *Sericomyia borealis*, popularly known as the singing-fly, which, it is said, has the ability to emit a peculiar singing sound without any vibration of its wings. It may here be pointed out that this power of emitting sound is not by any means confined to one member of this family of flies, since it is shared, in a greater or less degree, as far as my observations have gone, by nearly every species when resting on leaves in the sunshine. Some few years ago I was much engaged in the preparation and mounting of the diptera for microscopical purposes, collecting my Syrphidae after sun-down from the under side of leaves. When walking on a pathway skirting a flower border, I have frequently been attracted by the musical sound emitted when the creatures were resting on a leaf in the bright sunshine, and could never detect the slightest vibration in their wings. Mr. C. J. Watkins, who spends no little time in one of the richly-wooded coombes greatly affected by these flies, tells me that they frequently settle upon his coat-sleeves and entertain him with their pipings. He states that he has distinctly observed a very slight but rapid vibration of their wings. I cannot, however, help thinking that he is mistaken. One thing seems tolerably certain: if the *Sericomyia borealis* has power to emit the sound when apparently perfectly quiescent, then it may safely be assumed that other species of the family have power to do likewise. If, however the Syrphidae, more frequently observed, emit their music by the rapid, though unseen, vibration of their wings, then it may as safely be assumed that the so-called singing-fly produces its music in a precisely similar manner. There is a *Syrphus* which almost invariably produces the sounds when at rest in the sunshine, and sufficiently loud to attract attention when one is passing the plant on which it is resting. This insect is about half an inch in length, with very large red eyes and a dark thorax, beautifully shot with iridescent colours. I have always attributed this sound to one of distress, as on one occasion, when the creature was making an unusually loud noise, it was with its two fore-feet endeavouring to divest itself of a red parasite firmly attached to its proboscis. I have, too, often observed, when captured and lightly held between the two first fingers and thumb, so as to imprison but not hurt the fly, that it has emitted a particularly loud and plaintive sound. In this situation it is evidently impossible that any vibration of the wings could take place. Whilst on the subject of Syrphidae, another fact may be noted concerning these dipterous flies. They are not, as so frequently asserted in books, honey-loving flies. In some works on natural history it is stated that, after hovering over a flower, they will, with astonishing velocity, dart into the cup to sip the nectar therefrom. Although it cannot be supposed that the whole statement is a pure fabrication, it is, nevertheless, full of error. It would indicate that the honey was spread upon the petals of the flower, and that all the *Syrphus* had to do was to dart at it and take its fill; whereas every botanist knows that the honey is secreted in the nectary of a flower, almost invariably difficult of access, and requiring special organs for its extraction—such as the tongues of the honey- and humble-bees, or the astonishingly-long proboscis of some butterflies and certain moths. Nor, as may be at once seen, does the proboscis of the *Syrphus* in any wise resemble those of the bees. The fact is that the Syrphidae are pollen- and not honey-feeders, as any entomologist may readily prove. Let the student do as I have so frequently done for microscopic preparations, plunge the insect into liquor potassae. When the contents of the body have been partially dissolved by this powerful solvent, gently press the insect in the usual manner between two pieces of plate glass, so as to express the contents through the posterior part of the abdomen; where this is not transparent and empty, or nearly so, as very frequently happens, a quantity of greenish or yellowish substance is squeezed out. This will be found to consist of pollen grains, usually from three or four different species of flowers. Even after thus squeezing out seemingly the whole contents of the abdomen, upon examination, when fully prepared for the microscope, it will be seen that it still contains hundreds of grains, the majority of them consisting of pollen from the Umbelliferae, which are mostly affected by these flies, notably by *Rhingia rostrata*. In two mounted specimens lying before me, each contains a vast number of grains from three species of flowers. Some of them are of enormous size relatively to that of the insects, others of medium size, and some small. It is a subject of continual wonderment to me how these flies contrive to get these pollen balls into their stomachs, so large are they. It is as though a man swallowed whole platefuls of large oranges, sundry apricots, and hundreds of greengages. I am not by any means prepared to deny that any species of the Syrphidae have a taste for or can collect honey, but, so far as my observations are concerned, the species are few. I have, during the autumn months on warm sunny days, when the ivy blossom is literally alive with both dipterous and hymenopterous flies, noticed that *Eristalis tenax* will be found amongst them, claiming his share of the sweets. These, however, as every botanist knows, can be licked up without difficulty.—Edward H. Robertson, *Woodville, Greenhouse Lane, Painswick, Gloucestershire.*

CONDUCTED BY FRANK C. DENNETT.

	1899. April	Rises. h.m.	Sets. h.m.	Position at Noon. R.A. h.m.	Dec. dgs. min.
Sun	7	5.24 a.m.	6.40 p.m.	1.4	6 51 N.
	17	5.2	6.58	1.41	10 30
	27	4.42	7.14	2.19	13 51

	April	Rises. h.m.	Souths. h.m.	Sets. h.m.	Age at Noon. d. h. m.
Moon	7	3.52 a.m.	9.35 a.m.	3.33 p.m.	26 16 7
	17	10.2	6.5 p.m.	1.27 a.m.	7 5 39
	27	9.58 p.m.	0.56 a.m.	5.1	17 5 39

	April	Souths. h.m.	Semi-Diameter. ″.	Position at Noon. R.A. h.m.	Dec. dgs. min.
Mercury	7	0.27 p.m.	5·4	1.30	12 38 N.
	17	11.26 a.m.	5·8	1.7	8 1
	27	10.40	5·2	1.1	4 39
Venus	7	9.34	7·7	22.36	9 35 S.
	17	9.39	7·2	23.21	5 32
	27	9.44	6·9	0.5	1 10
Mars	7	6.56 p.m.	4·0	7.59	23 15 N.
	17	6.32	3·7	8.14	22 14
	27	6.10	3·4	8.31	21 3
Jupiter	17	0.39 a.m.	20·5	14.18	12 17 S.
Saturn	17	3.52	8·1	17.32	21 49 S.
Uranus	17	2·43	1·9	16.23	21 28 S.
Neptune	17	3.45 p.m.	1·3	5.28	21 59 N.

Moon's Phases.

	h. m.		h. m.
3rd Qr.	Apr. 3 ... 11.56 a.m.	*New*	Apr. 10 ... 6.21 a.m.
1st Qr.	,, 17 ... 10.43 p.m.	*Full*	,, 25 ... 7.22 p.m.

In perigee April 6th, at 1 p.m., distant 228,400 miles; and in apogee on 18th, at 2 p.m., distant 251,200 miles.

Conjunctions of Planets with the Moon.

				dgs. min.
April 2	Saturn	2 a.m.	planet	2 16 N.
,, 7	Venus*	9	,,	5 43 S.
,, 10	Mercury*	2 p.m.	,,	2 18 S.
,, 18	Mars*†	8 a.m.	,,	5 0 N.
,, 25	Jupiter	11 p.m.	,,	5 53 N.
,, 29	Saturn*	7 a.m.	,,	2 9 N.

* Daylight. † Below English horizon.

Occultations and Near Approaches.

Apr.	Star.	Magnitude.	Disappears. h.m.	Angle from Vertex. dgs.	Reappears. h.m.	Angle from Vertex. dgs.
13	υ^2 Tauri	5.5	8.35 p.m.	140	Near approach only	
15	η Geminorum	3	8.6	152	,,	,,
15	μ ,,	3.2	11.26	26	12.8 p.m.	283
28	θ Ophiuchi	3.4	11.56	114	13.6 p.m.	296

The Sun is now more frequently without spots than he has been for some time past. There has been an absence of dark spots noted up to March 12th on 18 days this year. In the corresponding period of last year on only six days was this the case.

Mercury is an evening star at the commencement of the month, not setting on the 1st until about 1 h. 30 m. after the sun, and situated about 2° east south-east of η Picium. It is in inferior conjunction with the sun at 8 a.m. on 12th, afterwards becoming a morning star, but too close to the sun for observation except in daytime.

Venus is a morning star, rising throughout the month about an hour before the sun.

Mars is on the border of Cancer, near κ Geminorum, at the beginning of the month, and travels eastward to very near γ Cancri, but its diameter is so small that it is beyond the reach of all but large instruments.

Ceres, the first discovered of the minor planets, is in opposition to the sun on April 24th, when it appears as a small 7th magnitude star. Its path takes it from 5° south of 109 Virginis gradually west-south-west.

Pallas, the next in order of discovery, comes into opposition on the 5th, and shines like a star of between 7th and 8th magnitudes.

	1899. April	Souths. h. m.	Magnitude.	Position at Noon. R.A. h. m.	Dec. dgs. min.
Ceres	1	2.6 a.m.	7.3	14.42	2 13 S.
	10	1.24	7.3	14.36	1 45
	20	0.33	7.2	14.28	1 20
	30	11.44 p.m.	7.2	14.19	1 5
Pallas	1	1.4 a.m.	7.4	13.40	15 28 N.
	10	0.22	7.4	13.34	18 6
	20	11.31 p.m.	7.5	13.26	20 28
	30	10.45	7.7	13.9	22 7

Jupiter travels along a short retrograde path in the western portion of Libra, near λ Virginis, and is in opposition to the sun at 7 p.m. on the 25th, and so is now in the best position for observation this year.

Saturn is almost stationary in the south-eastern part of Ophiuchus, rising just before 1 a.m. at the beginning of the month, and about a quarter to 11 p.m. at the end. The minor axis of the outer ring is still of greater angular diameter than the planet, and so presents a magnificent appearance.

Uranus slowly retrogrades along a path close to ω Ophiuchi.

Neptune has now practically left us for the season.

Meteors may be looked for specially on April 11th, 12th, 17th to 25th, 29th and 30th.

Meteor.—While walking along the road between Blackgang and Niton at about a quarter to eight on the evening of February 28th, we saw a magnificent meteor. It fell from eastward of the belt of Orion straight down towards the sea, below, but to the eastward of Lepus. Its course was midway between Orion and Canis Major. The meteor was larger than Sirius and brighter. As it fell it changed colour from white to a brilliant pale green and then to white again, before disappearing. My companion thinks there was a slight trail when the meteor was first seen, but I did not notice it, and there was none at all afterwards. What was the cause of the change of colour?—*Frank Sich, jun., Niton, Isle of Wight.*

[The change of colour must be due to the presence of some substance in its composition, which was not at first heated sufficiently to show its characteristic tint, and which was all gone before the meteorite was entirely dissipated.—F. C. D.]

Comets.—1899, *a*, *Swift*.—This veteran observer, at the Lowe Observatory, California, discovered, on March 3rd, a comet bright enough to be visible to the naked eye, situated in the constellation Eridanus, about 29° S. Declination, but which had decreased to 24° 8′ by March 6th.

1899, *b*, discovered on March 5th by Herr Wolf, of Heidelberg, in R.A. 1h. 16m., N. Declination, 31° 38′, a little south-east of β Andromedae, will probably prove to be Tuttle's (1858, I), and to have a motion towards east, a little south.

CHAPTERS FOR YOUNG ASTRONOMERS.

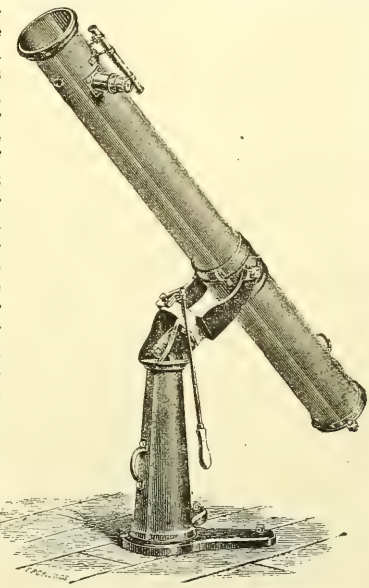
By Frank C. Dennett.

CHOICE OF A TELESCOPE.

(*Continued from page* 315.)

The next point to be considered is the stand. Many smart-looking stands are very shaky, and this is decidedly an instance where the old saying proves true, "handsome is as handsome does." A little while since I was using a three-inch telescope with a badly-made stand, which not only made the instrument uncomfortable for observation, but very difficult to truly focus; besides being susceptible to the slightest tremor of the atmosphere. The stand must be steady, and its motions not loose, but smooth. If rack or screw motions are fitted, all the better, especially when high powers are being used.

There are two kinds of stands, viz., alt-azimuth and equatorial. The first-named has vertical and horizontal motions, otherwise, in altitude and azimuth, hence the convenient contraction—alt-azimuth, which was first suggested by Dr. Wollaston. The ordinary pillar-and-claw stand is the commonest form of this class, but is, at the same time, a very inconvenient pattern for observing objects near the zenith. The pattern shown of a Cooke stand is a very great improvement (1), especially for over-head work. Celestial objects, however, do not apparently travel in circles parallel to the horizon, but parallel to the equator; consequently their altitude is constantly increasing until they reach the meridian, and then as constantly decreasing. To keep an object in the centre of the field of view, both hands are kept employed—one in turning the handle which gives the horizontal motion, and the other turning the handle to raise or depress the telescope.



Calver's "Popular" 5¼ in. Reflector.

For real work the equatoreal is much the simplest and best. A simple stand for a reflector, having equatorial motion, is illustrated. This has one motion parallel to the equator, the axis of rotation being parallel to the pole of our earth; and another motion at right angles to the first movement. Thus mounted, the telescope may be pointed to an object in the east, and, by the one motion, kept upon the object until it is well down in the west. The motion is always in the same relative direction to a line in the field of view, whilst with the alt-azimuth it is constantly changing. Consequently it is much easier to know the exact points of the compass, which is most important when making observations. For work on the sun, moon, and planets, especially, the instrument figured, with its 5¼ inch mirror, is most serviceable, as I can personally testify from much experience.

As the motion is parallel to the equator, if a circle be added, having the hours I. to XXIV. marked upon it, and a circle on the other axis, showing how many degrees the telescope is pointing above or below the equator, it is easy at any time to turn the instrument on an object above the horizon whose right ascension and declination is known. A figure of a simple stand of this class, by Banks, in size suitable for a three-inch refractor, will appear in the next number of Science-Gossip.

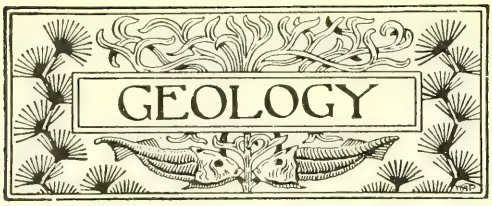
For the equatorial telescope to be of really practical use, it must be accurately placed in adjustment, and, so far as possible, not moved about, otherwise the reading of the circles is not to be depended upon. To get over this difficulty, three stone or metal cups are very useful if fixed in the ground in which the points of the tripod fit, when the telescope is ready for operation; but such cups must be protected from injury. The stand of the reflector above mentioned is conveniently portable. It should have a stout square box filled with earth to stand upon. The box should be set with its sides as nearly east, west, north, and south as possible, and then made a fixture. The telescope and stand can be set upon it, and got into adjustment. A piece of beading may be laid against the two toes of the stand, and nailed to the box; the stand may then be easily removed and replaced, with a little care, in approximate adjustment. Of course, the box should be well protected with paint.

As the motion to keep an object in the field of view of an equatorially-mounted telescope is only in one direction, that motion may be communicated by clockwork, which leaves both hands of the observer free to make drawings or measurements.

In advising the purchaser in the choice of a telescope, there are two important considerations: how much can one afford to spend? and for what is the instrument wanted? If the astronomer desires an occasional peep at the heavens, and then to take the glass down to the sea-side to use as an ordinary telescope, a refractor will be most useful. If, however, he means down-right hard work in physical astronomy, my candid advice is to have a reflector. I will give my reasons. We will suppose that £30 is the cash to be expended; for this sum a refractor of 3 in. or 3½ inches aperture on an equatorial stand, may be obtained, with say four eye-pieces and a solar diagonal. On the other hand, a 5¼ inch reflector may be purchased with the same number of eye-pieces and the solar diagonal. The former would divide double stars as close as about 1·5″ or 1·4″, also define the principal division on Saturn's ring, and show the cluster 13 Messier in Hercules on the finest dark nights as though sparkling with minute gold dust. The latter instrument would divide double stars 0·9 inch apart, show the "crape veil" of Saturn, with possibly an occasional glimpse of a fine division of the outer ring, and exhibit 13 Messier as a sparkling group of stars.

(*To be continued.*)

(1) See figure, *ante*, p. 314.



CONDUCTED BY EDWARD A. MARTIN, F.G.S.

DRIFT NOMENCLATURE.—Every one must cordially endorse Mr. Martin's remarks (*ante* p. 318) as to the desirability of adhering to one system of nomenclature with regard to drift deposits, yet the difficulty of framing such a system is only too obvious. As our knowledge is extended so will our nomenclature be altered, and the introduction of new terms or the different application of well-established names must, for a time at least, cause a little confusion. Another source of error is personal opinion, and arises from different views as to the correlation of the various deposits. It is to both these causes that the differences between Mr. Salter's views and mine are to be ascribed. Every geologist must admire the amount of good work which Mr. Salter has accomplished in the gravels of the South of England, and it is with great reluctance that I differ from him. As I understand Mr. Salter, he charges me with using inappropriate terms and with misquoting him. Hence a criticism of his paper is the best means of refuting these statements. Mr. Salter's views were given in "Pebbly and other Gravels in Southern England" (Proc. Geol. Assoc., vol. xv., pp. 264-286). He has divided what he calls "The Thames Valley Gravels" into three series, as stated by Mr. Martin: (1) The high level or early drifts; (2) Lower plateau and glacial drifts; (3) The river drifts. I intend dealing here only with those which belong to the lower Thames. In the first group he places Swanscombe Hill, Ash, Well Hill, Shooter's Hill, and West Ho Hill. The well-known deposits at Ash and on the chalk plateau were called by the late Sir Joseph Prestwich "The chalk plateau drifts," and this name, I think, should be retained. To correlate the other deposits with those at Ash is, in my opinion, founded on very slight evidence, and to connect them with the Thames is "a vast return of theory for a very small investment of facts." Mr. Salter is now inclined to call them Pliocene. They may be, but the *onus probandi* is on his shoulders. Well Hill deposit is a mere patch, and West Ho Hill is no better. There is no section at Swanscombe Hill, and the Shooter's Hill deposit is claimed by Mr. Goodchild as of "glacial origin." Hence I would submit that it is better to speak of these gravels as of "doubtful age, perhaps connected with the initial stages of the Thames." In his second series, "the lower plateau and glacial," Mr. Salter places Limpsfield Common, Farley Hill, Boughton Hill, and Dartford Heath. He also states (p. 274): "No contemporaneous fossils, such as large mammalia, have been recorded from this set of gravels." In the first place, the application of the term "lower plateau or glacial" to these gravels is quite new. Sir Joseph Prestwich speaks of this stage as the "High level or Limpsfield gravel stage." It is to this series that I applied the term "high level," so if I have erred, I am in good company. Mr. F. C. J. Spurrell has stated that the oldest deposit of the Thames "is the widely-spread tract of Dartford gravel (the highest terrace), extending many miles on either side of the present river. This gravel contains palaeolithic implements." Sir Joseph Prestwich notes "The gravel at Dartford forms part of the great sheet which extends westward over Wilmington and Dartford heaths, and eastward to Stone and Milton Street, near Swanscombe." Mr. Salter, however, considers the gravel of Galley Hill as not belonging to this but to his third series, and is thus opposed to both Sir Joseph Prestwich and Mr. Spurrell. Personally I feel confident that Mr. Salter is in error, and if only he would re-examine the ground he would doubtless recant his views. The human remains from Galley Hill are not the only known contemporary fossils from the Dartford gravels: Dr. Corner has a tusk of hippopotamus from Milton Street; Mr. Elliott has a deer's antler and foot bones of *Felis leo* from near Swanscombe, at the same level; Mr. Spurrell has found *Elephas primigenius*, *Rhinoceros*, *Bos*, *Equus*, and *Cervus*, in the small patch of gravel near Northfleet Station, and the same species in the similar terrace gravel at Dartford Brent, west of the city asylum, besides other remains at intermediate localities. Hence it will be seen that contemporary fossils do occur in Mr. Salter's second series, and he must either withdraw his negative, or else, in opposition to all authorities, withdraw the Dartford Gravel from his second series. I would strongly object to Mr. Salter's terms, "lower plateau and glacial." The term "plateau drift" has been applied to the Ash beds, and to prevent confusion it had better be confined to them. As to the use of the adjective glacial, if it implies the origin, it is incorrect; if it implies age, it is misleading. It is far better to restrict the term "glacial" to the method of deposition, and hence I still maintain that it is better to use the term of Sir Joseph Prestwich—"high level." In his third series—"the river drifts"—Mr. Salter has included deposits of various ages and manner of deposition. As I have already shown, the Galley Hill deposit, which he places here, rightly belongs to his second series. The gravel near Hayes Station, in the valley of the Ravensbourne, and the Green Street Green deposit in that of the Cray are not river drifts at all. As was pointed out years ago by Charles Darwin, they denote a much colder climate when the district was buried during winter in snow, and the ground frozen. In summer time the snow would melt rapidly, and would sweep the *débris* lying on the higher ground into the valleys. No one who has seen a true river gravel would consider this mass of unstratified and little-worn mass of flints as of river origin. If Mr. Salter would correctly apply the term "glacial," it should be to this deposit rather than the Dartford gravel. To lump this deposit with the Palaeolithic gravels and the Crayford brick-earths, is a course which commends itself to few of the students of Pleistocene geology. I started these remarks with the intention of proving certain statements that I had previously made. Whether I have done so, I leave your readers to judge. I would justify it by the fact that it is only by free discussion of differences such as these, that we can arrive at the truth.—A. SANTER KENNARD, *Beneden, Mackenzie Road, Beckenham.*

CONTRIBUTED BY FLORA WINSTONE.

Bollettino dei Musei di Zoologia ed Anatomia Comparata (Turin, July to December, 1898). These publications, issued by the University of Turin, contain many notes of interest and value. Signor M. G. Peracca, Assistant at the Zoological Museum, describes a new species of the genus *Xenopus*, namely, *Xenopus clivii*, obtained from Cape Bottego. It bears a close resemblance to *X. calcaratus* Buch., a species chiefly obtained from Western Africa. No. 324 of this Bulletin, for September 29th, 1898, consists of an account by Signor Filippo Silvestri of twenty new species and some new genera of Diplopodi. The article is illustrated by twenty-eight figures.

Bulletin de la Societe Royale Linneene de Bruxelles (Brussels, January, 1899), contains a report of the affairs of the Society during 1898. The work of the year appears to have been very satisfactory, one of the chief events being the measures taken to arrest the propagation of the San José scale-insect, to which we have previously referred (*ante*, p. 245). It is to be hoped, however, that these precautions will not be the commencement of further difficulties in the way of European horticulture. M. A. Disard writes on the physiology of grafting. He deals chiefly with the hybrids resulting from grafting one species of plant on to others. Amongst several instances is that of *Cystisus laburnum* and *C. pupurens*, the resulting hybrid being *C. adami*, of which some of the laburnum branches have bunches of yellow flowers, and others clusters of beautiful purple blooms. It is a remarkable example of dissociation of the characters that so frequently produce hybridity. Another example is that of belladonna (*Atropa belladona*), which, grafted on a plant of potatoes, produces a perfect hybrid—a sort of potato-belladonna containing atropine and, consequently, very poisonous. M. S. Mottet gives an account of a new method of obtaining the germination of seed, by means of which the grains are maintained at a uniform humidity. The apparatus is figured and appears likely to be of great use to those who are desirous of studying the development of plants from their earliest stages.

Cosmos (Paris, March 4th, 1899). This number contains an article by M. Laverune on "Embalming." After a clear and concise description of the methods employed by the Egyptians, both for the rich, the poor, and some animals, he goes on to describe the manner practised and invented by M. Gannal, doctor to the armies of Napoleon the First. It consisted of injecting into the carotid arteries a preservative mixture which would impregnate all the tissues. This mixture could be either a solution of sulphate of aluminium or chloride of zinc. The writer points out that embalmment was necessary in Egypt, as owing to the periodical overflows of the Nile, bodies that had only been buried, would become dangerous by reason of the pestilential exhalations. He also suggests its reintroduction in the present day as a solution of some of the problems that require attention in our own times. An unsigned account of the Panama canal is of considerable interest, especially as it is illustrated by five photographs taken at Bahia, Culebra and Carosita. The writer warmly supports the action of the new company in forming a commission of eminent engineers to consider the best means of completing this gigantic piece of work.

Le Journal de l'Acetylene (Paris, February 19th, 1899). The editor of this journal evidently suffers, as do so many other people when working on a new industry, from friends taking the opinions of those who are not coversant with the subject, instead of consulting men who have devoted time and thought to perfecting their knowledge of the points under discussion. He publishes a letter received from an acquaintance who had requested him to supply some information on this subject, but who afterwards consulted "an engineer," who evidently had but a cursory knowledge of acetylene. The objections detailed in the latter are dealt with point by point, in a sensible manner likely to be useful to those who haye to answer similar difficulties. M. Henri Moissan continues and finishes his notes on the action of acetylene upon ammonium metals. Reference was recently made in these pages to a note that appeared on these investigations, in "Comptes Rendus" (*ante* 251), also by M. Moissan.

American Journal of Science (New Haven, Connecticut, February 1899) contains an interesting article by Mr. H. A. Pilsbry on the Littoral Mollusks from Cape Fairweather, Patagonia. It is illustrated by a plate containing six figures. The collection he describes was obtained by Mr. J. B. Hatcher during his palaeontological explorations in Patagonia in the interest of Princeton University. The fauna of the south-west of America is very little known; therefore all facts are of assistance and value, in order that the limits of the faunal provinces of the coast may be defined more clearly, and their characteristics described. The fauna at the point described, Mr. Pilsbry says, is typically magellanic, with very little mixture of types from the Argentine fauna at La Plata region, and the indications point to a western rather than a northern origin of the mollusk population. The principal families described are Buccinidae, Trochidae, Patellidae, Mactridae, Mytilidae, with several others. Some short descriptions of imperfectly known and new Actineans, with critical notes on other species by Mr. A. E. Verill, will be of value to those who are studying that branch of zoology. There are six figures drawn by the author illustrating some of the species.

Transactions of the Academy of Natural Sciences, Philadelphia (Philadelphia, December 1898), contains the reports of the various departments on the work done during the year. The statements of the chiefs of the Conchological, the Biological, and Microscopical sections, are especially satisfactory. In the former, many important additions have been made to the North American series, and some collections which have been purchased or presented to the museum, materially augmented the non-American molluscs.

Charles Stuart Gregson.—There flourished in Lancashire during the later middle years of this century a company of vigorous field naturalists, who did much collectively and individually towards the elucidation of the flora and fauna of the northern counties of England. Most of these were known to us, and, alas! they have nearly all passed away. Among them were Edwin Burchall, the brothers Benjamin and Nicholas Cooke, Noah Greening, J. B. Hodgkinson, Ashworth, Sidebotham, Edleston, Carter, and Joseph Chapell, all close observers of Nature and learned in species and their life-histories. The last of these to leave is Gregson, most acute and, shall we say it, most belligerent of them all. When one comes to pass them in review, they were indeed a remarkable association, and one which well shows how varied were, in those days, the types in the republic of science. All earnest workers; some rich, others living by their daily toil, and practising science in hours stolen from repose. Fatigue had no terrors for botanist, entomologist, or other self-educated student of Nature. In general education they varied as much as in worldly riches; but all met on common ground, and no matter how much some disagreed, at heart each respected the other. What collections they made, and what exertion and ability were squandered on them. Charles Stuart Gregson was born at Lancaster on May 29th, 1817. He was brought up to the trade of a plumber, and prided himself upon the fact that he had assisted in building the present Houses of Parliament. Always possessed with a taste for observation of living things, he rapidly became an authority in lepidopterology, ornithology, and some branches of marine shells. His quaint old house was a veritable museum and well worth visiting, for one invariably came away with the feeling of having learned something from the host's rugged personality or his surroundings. For some time past Mr. Gregson had felt the approach of senility, especially in regard to failing eyesight. Consequently he disposed of his remarkable collection of butterflies and moths, which was acquired several years ago by Mr. Sidney Webb, of Dover. Among his collecting grounds, Gregson greatly favoured the "Mosses" of Lancashire and the coast sandhills of that county and Cheshire. North Wales, with its ranges and ridges of mountain limestone, and the precipitous cliffs of the Isle of Man, were to him most fascinating. His chief quarry in the former was the moth *Agrotis ashworthii*, whilst the latter produced the local lepidoptera occurring there. Age had rather separated Gregson in later years from the naturalists of his county, but he occasionally appeared among them. As a recounter of anecdote and reminiscence, he was not only amusing, but at times astonishing. He died on the 31st of last January, without serious ailment, other than failure from old age, passing away quietly in his eighty-second year.—J. T. C.

The South London Entomological and Natural History Society.—Annual Meeting, January 26th, 1899, Mr. J. W. Tutt, F.E.S., president, in the chair.—A very satisfactory balance sheet was adopted, and the council's report, giving a *résumé* of the past year's work, having been read, the following gentlemen were declared elected to fill the various offices in the society. A. Harrison, F.L.S., F.E.S., &c., *President*; Dr. Chapman, F.E.S., and J. W. Tutt, F.E.S., *Vice-Presidents*; T. W. Hall, F.E.S., *Treasurer*; H. A. Sauzé, *Librarian*; W. West, *Curator*; Stanley Edwards, F.L.S., F.E.S., and Henry J. Turner, F.E.S., *Hon. Secretaries*; R. Adkin, F.E.S., F. Clark, H. S. Fremlin, F.E.S., M.R.C.P., W. J. Lucas, B.A., F.E.S., H. Moore, A. M. Montgomery, and R. South, F.E.S., *Council*. Mr. Tutt then read an admirable presidential address, which dealt with the value of field work to the science of Biology. February 9th, 1899, Mr. A. Harrison, F.L.S., president, in the chair.—Mr. Russell exhibited a specimen of *Plusia moneta*, taken at Southend, near Catford, in July, 1898; it was noted how rapidly the species was spreading its range of habitat. Mr. Adkin, a series of *Hadena pisi*, from Aberdeenshire, with southern English forms for comparison; the former were of a blackish brown or dull purple, showing a strong contrast to the red English form. Mr. Lucas, a series of *Rhyparobia* (*Panchlora*) *maderiæ*) taken at Kew Gardens in a package received from the Belgian Congo, and contributed notes on its distribution. Mr. Main, specimens of the brilliant Coleopteron, *Aspidomorpha sancte-crinums*, from Bombay, which had been preserved in a dilute solution of formalin; a discussion ensued as to the amount of formalin in the solution, and also as to its action; it was thought that no more was necessary than just sufficient to sterilize the water, say 1 per cent. Mr. Harrison, series of varieties of the egg of the blackbird, including one having a deep brown blotch completely covering the larger end, and also a bred series of *Pseudoterpna pruinata* (*cytisaria*) from New Forest larvae. Mr. Fremlin read a note received from Mr. Chadwick, of Devonshire, giving an account of an observation of *Amphipyra pyramidea* swimming across a stream at least thirty yards wide; in the discussion which ensued, Mr. Tutt and others gave various instances of the swimming capabilities of several species of Lepidoptera. Dr. Chapman then read a paper, entitled "Some Points in the Evolution of the Lepidopterous Antennæ," illustrating his remarks by blackboard diagrams and numerous figures of antennæ sculpture. A discussion took place, and it was considered that the paper was one of the most important of the series of evolutionary studies which Dr. Chapman had for some time been contributing to various societies and magazines.—*H. J. Turner, Hon. Report Sec.*

North London Natural History Society.—Thursday, March 2nd, 1899.—Exhibits: Mr. Frost,

Cucullia verbasci, just emerged from pupa, the larvae having been obtained in 1897; the pupae were forced at a temperature of about 80 degrees in the spring of 1898, but nearly all went over to a second winter, and emerged early in 1899. Mrs. Robbins, a singular freak of a pink double anemone, in which two perfectly-developed sepals took the place of bracts. Mr. Prout, on behalf of Mr. Loddiges, a cinnamon-coloured variety of the common mole. Communications: Mr. Woodward reported having seen a sallow in full bloom on February 25th. Mr. Jennings stated that a hawthorn in Pymm's Park, Edmonton, had the flower-buds already well advanced; the leaves were as yet about half expanded. Paper: Miss Bacot read a paper entitled, "Extracts from Letters from the Transvaal;" containing a varied and interesting selection of natural history notes from her brother, chiefly from the neighbourhood of Johannesburg. Exhibits of birds and insects from the Transvaal, as well as a large number of photographs, were also passed round in illustration of the paper.—*Louis B. Prout, Hon. Sec.*

City of London Entomological and Natural History Society.—Meeting, 21st February, 1899. Exhibits: Mr. C. Oldham, a series of *Calymnia affinis* and of *C. diffinis* taken in Epping Forest in the summer of 1898, and four *Euchelia jacobaeæ* from Mid Norfolk. Mr. J. A. Clark, a specimen of *Gonepteryx rhamni* captured at Croydon last autumn, the two fore-wings having the coloration of a female insect, and the hind wings that of a male. Mr. J. Riches, a number of the carnivorous shelled slug *Testacella haliotidea* from Hornsey. Mr. A. Bacot, a box of South African Lepidoptera from a station near Johannesburg, many appearing identical with British insects, such as *Sphinx convolvuli* though smaller than our form of this insect, a large-sized *Lithosia complana*, also two resembling *Laphygma exigua* and *Heliothis armigera*. Rev. G. A. Raynor, about 300 specimens of *Spilosoma lubricipeda*, the produce of wild larvae obtained from the Lincolnshire coast after four years' breeding. Many of the dark aberrations *radiata* were remarkable, but he had not bred all the forms obtained in Yorkshire. He also showed a male *Epinephele tithonus*, caught last August at Hazeleigh, near Maldon, in which the rust-red colour is replaced by light yellow, and one *Noctua rubi* variety, taken at the same locality. A male *Angerona prunaria* of an unusual unicolorous brown colour, with a spot only of orange on disc of each wing, was exhibited, together with some very variable forms of male and female obtained by pairing this insect with a typical female. Mr. F. B. Jennings, *Cypraea carniola* and *C. poraria* from Raine Islands, Queensland, and *Hyalinia glabra* from the Lea Valley. Mr. W. J. Kaye, a box of Jamaican *Pyralidae* collected by himself. Mr. H. Massey, a drawer of *S. lubricipeda* bred from wild larvae from York and Manchester including the varieties *eboraci* and *fasciata* from Yorkshire larvae only. Mr. A. W. Mera also brought up two drawers of this insect showing the type and varieties *fasciata* and *radiata*, to illustrate his paper of the evening. Mr. Bell, series of *Chariclea umbra* from the Isle of Wight. When captured, bright green "spikes" could be noticed on their heads, but were now withered. Mr. C. Nicholson, on examining these, said they were pollinia of orchids, and showed the flowers the insects had been visiting. Mr. A. W. Mera read a paper "Notes on *Spilosoma lubricipeda*." He said he had recently bred this insect from larvae sent him from the Lincolnshire coast and also from the strain originally started by Mr. Harrison, of Barnsley. In his experience, after a generation or two of inbreeding, perhaps one-third only of eggs obtained hatched, although the others changed colour and appeared fertile. Larvae capable of producing the varieties *radiata* or *zatima*, *eboraci* and *fasciata* are limited to the counties of Lincolnshire and Yorkshire. The fact that variety *radiata* could be bred, if not from wild larvae from Lincolnshire, at least if inbred only once, dispelled the idea that Yorkshire-bred *radiata* must necessarily be of foreign orign. The so-called York form *eboraci* by no means implies that is the usual form of *S. lubricipeda* taken there, for certainly not more than 5 per cent. of York larvae produce variety *eboraci*, and not more than 1 per cent produce *fasciata*. In the course of his breeding, selected varieties crossed produced a partial second brood and specimens emerging in autumn showed greater variation than those lying over until the spring. With regard to the opinion of some entomologists that *radiata* is a distinct species, based on the fact that it is double-brooded, whilst *lubricipeda* is not, he said he had bred a second brood of the latter from Lincolnshire larvae, and his Lincolnshire larvae produced variety *radiata* in a small minority; at the same time he had no proof that *S. lubricipeda* was doubled-brooded in a wild state. Why does the *radiata* form occur only on the Lincolnshire and Yorkshire coasts? Some suggest that specimens may have migrated from Heligoland, where *radiata* is the type. But he thought that the same climatic influence that produces *radiata* in Heligoland is in some degree the same that we find in our N.E. counties. In the discussion, Rev. Mr. Raynor said he found elder was the food-plant of *S. lubricipeda* in Lincolnshire, and this had a tendency to produce dark forms. His experience did not correspond with the lecturer's in two matters: a second brood of *lubricipeda* was never reared by him at Maldon and he found eggs from pairings always hatched. Mr. Tutt had doubts as to the British origin of the parents from which variety *radiata* was first bred in Yorkshire. The Bristol *lubricipeda* type was unknown in Heligoland, where the dark form only occurred. A wild form or race on the Lincolnshire coast will produce dark *radiata* form if inbred and taken care of artificially, but dark forms are not found naturally in any numbers. In Heligoland, nature has preserved what breeders try for—isolation. If it is only a question of moisture or wet climate, why are the Irish and West England specimens so buff? Food can affect the imago in other directions than size: it may alter the scales, which are the last outcome of growth. The abnormality of these *radiata* is evident, and aberrant insects tend to produce a second brood. It was remarkable how common the insect was in the neighbourhood of towns, as if it had less fighting for existence there.—*H. A. Sauzé, Hon. Sec.*

Carlisle Entomological and Natural History Society.—March 2nd, 1899. Meeting held in the Art Gallery, Tullie House, Carlisle. Exhibits:—Mr. Geo. Wilkinson, *Micropteryx purpurella*, *M. semipurpurella*, *M. unimaculellii*, *M. sangii*, *M. caledoniella* and *M. sparmannella*, all from the immediate neighbourhood of Carlisle. Mr. F. H.

Day, a number of local Coleoptera including *Cychrus rostratus* and *Carabus granulatus*, both found under a rotten log; *Homalota circallaris*, *Bembidium monticola*, *Melanotus rufipes*. Mr. Jas. Murray, the four Cumberland species of *Ansapis*, viz.:—*A. frontalis*, *A. ruficollis*, *A. fasciata* and *A. melanopa*. Mr. J. E. Thwaytes communicated a paper on "Lepidoptera taken in 1898," and Mr. F. H. Day read "Notes on the species of Six-spot burnet-moths (*Anthrocera*) occurring near Carlisle."
James Murray, Hon. Sec., 11, Close St.

NOTICES OF SOCIETIES.

*Ordinary meetings are marked †, excursions *; names of persons following excursions are of Conductors. § Lantern Illustrations.*

GEOLOGISTS' ASSOCIATION OF LONDON. *Excursions.*

April 8.—Cycling Excursion, Twyford. H. W. Monckton, F.L.S., F.G.S.
,, 15.—Walton-on-the-Hill. W. Whitaker, B.A., F.R.S., and W. P. D. Stebbing, F.G.S.
,, 29.—Northampton or Stamford. B. Thompson, F.G.S., F.C.S.
May 6.—Thame District. A. M. Davies, B.Sc., A.R.S.M., F.G.S.
,, 13.—Ilford.
,, 18-24.—Brittany: St. Malo, Rennes, &c. C. Barrois, D.Sc.
,, 22&23.—Cycling Excursion. Rev. Prof. J. F. Blake, M.A., F.G.S.
June 3.—Redhill.
,, 10.—Rickmansworth and Harefield. W. Whittaker, B.A., F.R.S., Pres. G.S.
,, 17.—Excursion. Prof. C. Lapworth, LL.D., F.R.S., and Prof. W. W. Watts, M.A., F.G.S.
,, 24.—Brighton. H. Edmunds, B.Sc.
July 1.—Medway Valley. G. E. Dibley, F.G.S., and A. E. Salter, B.Sc., F.G.S.
,, 15.—Guildford.
,, 22.—Cycling Excursion.
Aug. 3-9.—Derbyshire: Peak Forest—Headquarters at Matlock Bath. One night at Castleton. H. Arnold Bemrose, M.A., F.G.S., Dr. Wheelton Hind, F.G.S., and J. Shipman, F.G.S.

Frederick Meeson, Chairman, Excursions Committee, 29, Thurloe Place, South Kensington, S.W.

NORTH LONDON NATURAL HISTORY SOCIETY.

April 20.—†"My Trip to the Cariboos." W. S. Sebright Green, F.R.C.I.
May 4.—†"Comets and Meteors." C. Nicholson, F.E.S.
,, 18.—†"Notes on Tour in Swiss Alps." C. B. Smith.
,, 19-22.—*New Forest. C. Nicholson, F.E.S.
,, 22.—*Cuxton. L. B. Prout, F.E.S.
,, 27.—*Epping Forest. L. J. Tremayne.
June 1.—†"Some Old Microscopists and their Work." W. H. Barber.
,, 15.—†"Evolution of Scenery." R. W. Robbins.
,, 24.—*Chesham. L. B. Prout, F.E.S.

PRESTON SCIENTIFIC SOCIETY.

April 12.—†"Flowers and Flowering." W. Clitheroe.
,, 26.—†"Life-History of Flat Fishes." Andrew Scott.
,, 6, 7, 10, 13, 17, 18, 19, 21, 24: May 1, 5, 8, 15, Sectional Meetings and Instruction Addresses. Lecture Hall, 119, Fishergate, Preston.

W. Hy. Heathcote, Hon. Sec.

SELBORNE SOCIETY—CROYDON AND NORWOOD BRANCH.

April 15.—*Sanderstead and Croham Hurst.
May 20.—*Purley Down.
June 17.—*Merstham and Caterham.
July 15.—*Reigate Heath.
Aug. 19.—*Belmont, Woodmansterne, and Chipstead.
Sep. 16.—*Mitcham Common to River Wandle.

SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.

April 13.—†Microscopical Evening: "Freshwater Entomostraca." Mr. Scourfield, F.R.M.S.
,, 27.—†§"Insect Anatomy." Mr. F. Noad Clarke.
May 11.—†Lantern Demonstration. J. W. Tutt, F.E.S.
,, 27.—*Field Meeting at Chatham. Mr. Walker, R.N., F.E.S.
June 10.—*Field Meeting at Byfleet.
July 15.—*Field Meeting at Wisley, *via* Effingham.

Hy. J. Turner, Hon. Report Sec.

CITY OF LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.
1899.
April 4.—†"Crossing of *Lasiocampa quercus* and its vars." R. Bacot.
,, 18.—†"Coleoptera." H. Donisthorpe.

IMPORTANT NOTICE.

THE Proprietor of SCIENCE-GOSSIP having decided to manage the business department from an independent office at 110, Strand, London, W.C., all subscriptions, advertisements and payment for advertisements must in future be sent to that address, and no longer to the Nassau Press. We desire to refer our readers to advertisement page iv. accompanying this number.

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TO CORRESPONDENTS AND EXCHANGERS.—SCIENCE-GOSSIP is published on the 25th of each month. All notes or other communications should reach us not later than the 18th of the month for insertion in the following number. No communications can be inserted or noticed without full name and address of writer. Notices of changes of address admitted free.

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NOTICE.—Contributors are requested to strictly observe the following rules. All contributions must be *clearly* written on one side of the paper only. Words intended to be printed in *italics* should be marked under with a single line. Generic names must be given in full, excepting where used immediately before. Capitals may only be used for generic, and not specific names. Scientific names and names of places to be written in round hand.

THE Editor will be pleased to answer questions and name specimens through the Correspondence column of the magazine. Specimens, in good condition, of not more than three species to be sent at one time, *carriage paid*. Duplicates only to be sent, which will not be returned. The specimens must have identifying numbers attached, together with locality, date, and particulars of capture.

THE Editor is not responsible for unused MSS., neither can he undertake to return them, unless accompanied with stamps for return postage.

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NOTICE.—Exchanges extending to thirty words (including name and address) admitted free, but additional words must be prepaid at the rate of threepence for every seven words or less.

OFFERED, Dixon's "Geology of Sussex," Kirby and Brady's "Fossil Entomostraca," Murchison's "Siluria," Morris' "Fossils," "Memoirs of Geological Survey." Wanted, Exotic Helicidae, or books of travel."—Miss Linter, Saville House, Twickenham.

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